



An Orbia business.

Seizing the Moment: Accelerating Innovation in Fiber Infrastructure

Our reliance on technology is reaching new heights every day. Ubiquitous fiber connectivity is no longer just a convenience – it's a necessity.

Across the globe, new funding from both public and private sectors is available to meet this rising demand and appetite for innovation, while new advances in infrastructure are expanding the possibilities. Organizations must act quickly to take advantage of this unique moment in time, but they can't afford to lose sight of long-term opportunities.

Rising Demand for High-Performance Connectivity

In recent years, the world has realized how important connectivity really is to our daily lives. It enables people to work remotely, provides children with access to education, and helps us keep in touch with friends and family.

The private sector is also innovating to create more capacity and build new products and services that rely on high-bandwidth, low-latency, and always-on connectivity. From smart cities to precision agriculture, there seems to be no limit to what connectivity can enable.

All of this is creating a need for millions of new optical fiber end points to facilitate connectivity, be it fixed or wireless.

The Need for Connectivity in Precision Agriculture

NETAFIM™

Recent developments in precision agriculture are making it easier for farmers to collect and analyze real-time data about the conditions of crops, soil, and ambient air, along with other relevant information, such as hyperlocal weather predictions, labor costs, and equipment availability. This helps them avoid wasting resources and ensure that their fields are in optimum health, while also reducing costs and controlling environmental impact.

With today's growing threat of climate change, booming global population, and diminishing arable land, these data-driven processes are more important than ever. However, satellite and 4G infrastructure cannot necessarily provide the required combination of bandwidth, latency, and sensor density. Farmers will need consistent in-field communications delivered via optical fiber, or fiber-enabled 5G, to truly have the desired impact in improving crucial environmental outcomes – though such technologies can be challenging and costly to deploy in rural settings.

Dura-Line's sister company, Netafim, is a global leader in precision irrigation.

Find out more at
www.netafim.com.



According to Open Vault’s Broadband Insights Report, bandwidth consumption rose 165% from 2017-2021, with the average monthly data consumption increasing to 536 GB per subscriber. At the same time, the Organization for Economic Co-operation and Development (OECD) reports that fiber in particular is on a rapidly rising trajectory, growing more than 35% since just 2019 and taking the top spot among broadband technologies. **In fact, the U.S. is expected to deploy more fiber between 2022 and 2027 than it has deployed to date.** As a result, fiber investment is ramping up across all market segments.

Global Fiber Investment Ramping Up Across Market Segments

Fiber to the Home (FTTH):

\$29.7 billion global market investment predicted by 2026 (excluding federal funding). [Source](#)

Government:

More than \$125 billion available in government stimulus and funding worldwide. [Source](#)

5G Infrastructure:

\$520 billion investment in 5G between 2022 and 2025 by mobile operators worldwide. [Source](#)

Data Centers:

Hyperscale computing operators expected to double capital expenditures by 2026 – approximately \$350 billion. [Source](#)

Funding Widely Available

Despite widespread inflation and tightening budgets, there’s no shortage of funding for full-fiber networks. Because there are clear connectivity gaps in areas without reliable service – particularly lower-income and remote, rural regions – both public and private sectors are motivated to address the digital divide by expanding network access.

Governments have viewed it as an opportunity to drive growth and level the economic playing field for citizens, while operators have demonstrated a willingness to invest in gigabit-capable services to maintain a competitive advantage. The global COVID-19 pandemic has only accelerated this urgency.

What’s driving all this growth?

- **Market competition** – between large, established operators with national plans and new, smaller players that can be more agile and able to seize opportunities more quickly
- **Fiber networks funded by private equity** – viewed as a secure investment in uncertain times, backed by unprecedented fiber market growth and deployment
- **Government funding** – particularly for hard-to-reach areas, disadvantaged communities, and a new frontier of innovative technologies (automation, driverless vehicles, etc.) that require fiber infrastructure to be in place first
- **New policies and regulations** – with preferences for “fiber first” and co-investment models that grow critical infrastructure and boost the economy (through government stimulus and job creation)

Public Broadband Funding Around the World

Broadband Equity Access and Deployment (BEAD) Program (funded by IIJA)
\$42.5 billion (U.S.) [Source](#)

Rural Digital Opportunity Fund (RDOF)
\$20.4 billion (U.S.) [Source](#)

American Rescue Plan Act
\$20 billion (U.S.) [Source](#)

Grey Spots Funding Program
€12 billion (Germany) [Source](#)

Project Gigabit
£5 billion (U.K) [Source](#)

Italia a 1Giga
€3.65 billion (Italy) [Source](#)

Connecting Europe Facility
€1.83 billion (E.U.) [Source](#)



of small providers are planning to apply for federal funding in the U.S.

Urgency to Expand Connectivity

In the face of growing customer demand, intensified government focus, and increased competition, many network operators are feeling a sense of urgency to meet connectivity targets. Despite their efforts to act quickly, there are a variety of industrywide concerns that may prevent them from realizing their future network goals.

For example, the cost of digging up roads can be prohibitive – not to mention the resources required for permitting and traffic management. On top of that, long lead times on critical construction materials and network components are impacting operators worldwide. As a result, project delays are now the norm rather than the exception.

Finding skilled labor is another challenge, as there is a shortage of workers who are trained in disciplines such as network design, installation, and maintenance. [In fact, the global technology, media, and telecommunications sector is expected to have a deficit of 4.3 million skilled workers by 2030.](#)

All of these factors combine to put a squeeze on ROI for operators and contractors alike.

On top of this, operators are becoming increasingly concerned with the sustainability of their operations. As the IT sector produces significant carbon emissions (notably through the production and powering of components), more operators are focusing on finding ways to lower emissions and run their businesses more sustainably. They do this by using alternative deployment methods, sharing rights of way, overprovisioning whenever they deploy new capacity, and seeking greater circularity in their supply chains.

How Dura-Line is Addressing Growing Concerns

To bridge the labor and skills gaps, Dura-Line launched its **Dura-Line Academy** to help workers gain the skills to design, maintain, and install networks. Learn more at academy.duraline.com.

Dura-Line has acquired **Biarri Networks**, a leading technology provider specializing in fiber optic network design solutions, to help its clients by utilizing the latest in automation to help design and deploy fiber networks faster.

Dura-Line has been using sustainable manufacturing processes for more than 15 years. Here are a few ways Dura-Line produces its products responsibly:

- Utilizing a closed-loop water system
- Reusing routine manufacturing fallout in new, installable products
- Working toward a zero-waste-to-landfill goal
- Implementing a reel reuse program
- Maximizing renewable energy sources

Learn more about Dura-Line's commitment to sustainability on its parent company's website: orbis.com/sustainability/.





How can you seize the moment?

With connectivity demand, funding, and industry appetite aligned, it's clear that now is the time to seize the moment for innovation. While there is a lot to consider around the future of connectivity, it is crucial for network operators to remain forward-thinking to ensure short-term plans also account for future bandwidth demands and potential revenue opportunities.

Dura-Line can help you achieve both your short-term and long-term goals through these three approaches:

1

Shift from traditional networks to scalable designs

2

Collaborate across the ecosystem to improve outcomes

3

Tap into infrastructure that already exists

APPROACH 1

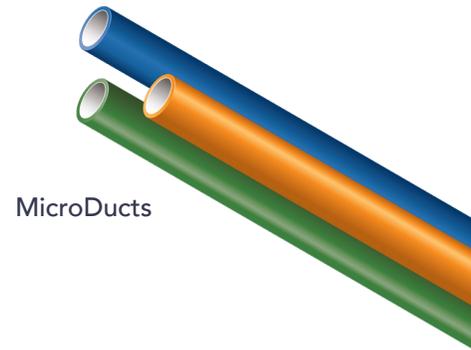
Shift from traditional networks to scalable designs

The challenges infrastructure owners are facing mean that every project needs to deliver maximum impact and prioritize future-fit infrastructure. Until recently, this has been addressed by simply burying extra standard-size conduits. During installation, this means digging bigger trenches or drilling more pathways and taking up more space underground – which generally results in more time, cost, and disruption. Multiple reels of bigger duct also require more logistics, handling considerations, and jobsite management.

Achieving impact and future-readiness can be done much more efficiently and sustainably with MicroTechnology, which consists of MicroDucts, FuturePath® (several MicroDucts bundled together to deliver multiple pathways under one polyethylene oversheath), and associated accessories.

There are also advanced products, such as FuturePath Hybrid, which combine standard ducts and MicroDucts under one oversheath – allowing operators to continue using traditional cable designs, while gradually transitioning to micro designs.

MicroTechnology has a major role to play in expanding connectivity thanks to systemic innovation in both ducts and optical fiber cables.



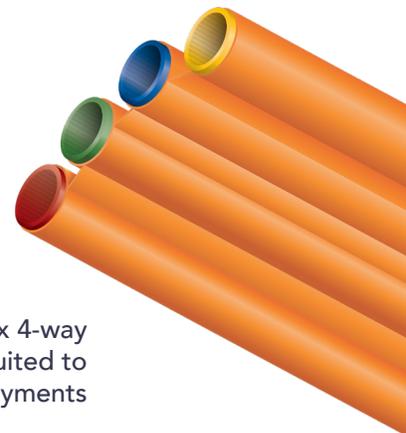
MicroDucts



FuturePath 7-way



FuturePath Hybrid 6-way with three larger and three smaller MicroDucts under one oversheath



FuturePath Flex 4-way perfectly suited to MicroTrench deployments

*Images are not to scale

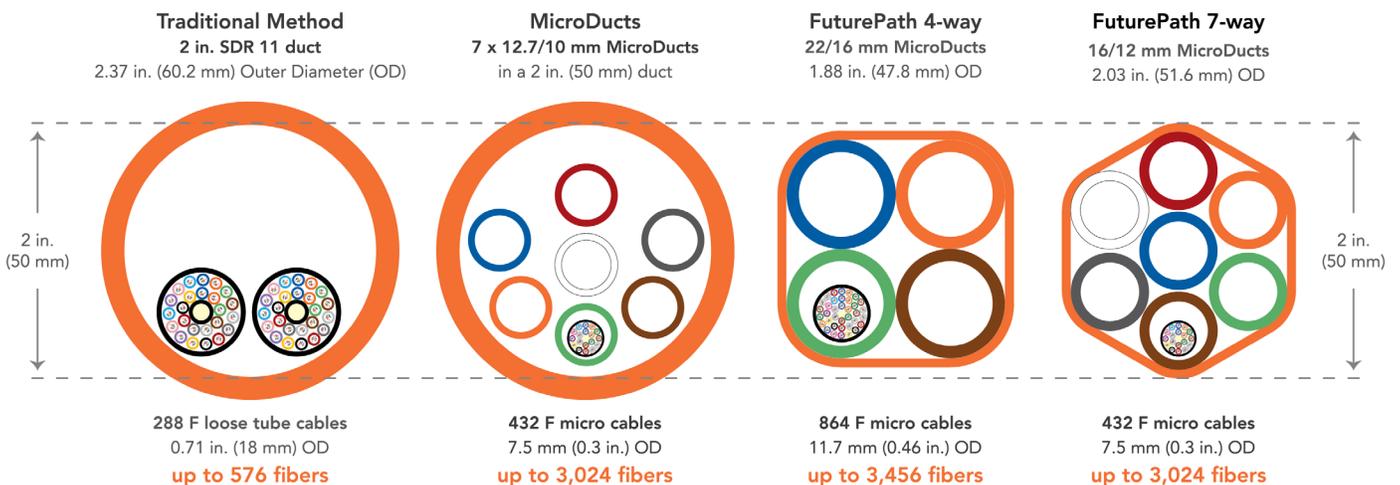
Selecting the best combination of duct and cable can be tricky.

Check out Dura-Line’s digital tools and calculators to help you make the best decision for your project. duraline.com/tech-center/digital-tools/

MicroDucts are miniaturized conduits that provide permanent protective pathways for fiber cables. They can be bundled together as FuturePath.

Compared to standard ducts, MicroDucts and FuturePath:

- Allow more pathways in the same or even a smaller space, expanding the network faster than you expand the footprint.
- Are easier to route to distributed locations, helping get connectivity where it needs to go. This is key for FTTH and 5G networks.
- Are typically direct-buried, but also can be placed within existing ducts, to get more from the infrastructure you already have.
- Make it easy to upgrade. There’s no need to dig or secure additional permits to replace cables or add connections.



MicroDucts and FuturePath provide more pathways, cables, and fibers in the same or smaller space to traditional ducts and cables.

Fiber optic cables live within a duct and make connectivity possible.

Compared to standard cables, micro cables:

- Are more than 60% smaller and 70% lighter, but much more dense – up to 864 fibers in a single cable.
- Add more connectivity while taking up less space in a duct.
- Are easier to transport and handle, with twice as much cable per reel or reels that are half the size, requiring smaller crews.
- Are faster to install, with high-speed cable jetting installation methods, which can typically deploy cables two to three times faster and further than traditional pulling methods – with achievable installation distances of over 6,500 ft., or 2 km.

With each project, operators can:

- Add new fiber whenever it's needed, rather than provisioning everything on day one.
- Reduce the amount of time and labor needed for every project.
- Make future upgrades faster and simpler.

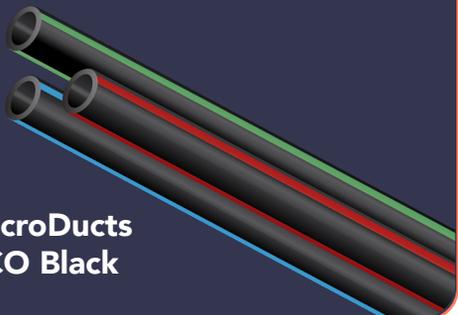
Sustainable Infrastructure From Dura-Line

Dura-Line developed MicroDucts and FuturePath® ECO, which help network owners increase sustainability in their supply chains by using up to 100% reground High-Density Polyethylene (HDPE) from Dura-Line's own manufacturing process. The products have already been successfully installed in live networks in The Netherlands.



FuturePath ECO
7-way

MicroDucts
ECO Black



Preparing for Future Technologies (and More)

As networks become increasingly multi-use, modern operators need a toolkit of solutions that allows them to not only meet present connectivity demands, but also exceed government bandwidth thresholds with ease.

Because technology is continuously evolving, it's important to make smart investments in infrastructure that can adapt over time. By preparing for likely shifts in advance, it's possible to achieve huge cost savings, simply by provisioning for extra capacity at the outset. This will have major benefits for multiple players, letting operators tap into the massive commercial leasing opportunities with greater ROI and enabling the public sector to get smart city ready with a lower investment overall.



FuturePath from Dura-Line offers flexible, scalable solutions for any kind of network, including various numbers and sizes of ducts within bundles, hybrid bundles, aerial constructions, and indoor variations.

MicroDucts and FuturePath can be installed via all common infrastructure construction methods: open trench, directional drill, plow, MicroTrench, sub-duct, and aerial.

Multi-Use, Future-Ready Networks

MicroDucts make it easier to adopt newer technologies at a significantly lower cost. For example, if you want to enable 5G connectivity when building out your last-mile infrastructure, it may only add as little as 10% to the cost when using MicroDucts, because your pathways will already be in place when it's time to install new fiber. This means you could add wireless capabilities for backup should the fixed connection go down, fill in hard-to-reach premises, or simply be ready for future critical applications.

Making the Most of Your Federal Funding

As federal funds are distributed, many regions are looking for ways to get the best value for their money. For example, in the U.S., \$42 billion of grant funding is available to local governments through the Broadband Equity Access and Deployment (BEAD) Program to update and expand their network infrastructure. While local authorities and governments can't make money from their investments in the same way companies do, there are still a variety of ways for them to benefit.

Governments can:

- Drive digital transformation in the public sector.
- Accelerate smart city development plans.
- Promote more competition in their region.
- Encourage faster, more affordable connectivity options for both residents and businesses.
- Prevent underserved communities from being digitally excluded.



regioHELP builds full-fiber networks in some of the most remote and challenging areas of Austria. Unlike other operators who avoid building in rural areas due to low population densities and high cost per premise, regioHELP works with local authorities and residents to deliver cutting edge networks that contribute to a better quality of life for rural communities. Central to this is the use of FuturePath from Dura-Line. FuturePath not only provides high-speed connectivity for subscribers today, but also allows regioHELP to scale up for future applications (such as 5G) at minimal incremental cost in what is typically a very costly, challenging environment.

Pennsylvania Turnpike Commission

Dura-Line has been working with the Pennsylvania Turnpike Commission to install a FuturePath 8-way, which includes two MicroDucts for their own purposes and six others for leasing to cellular network operators and other parties seeking high-speed connectivity.

Instead of utilizing traditional trenching methods (digging large trenches in roads/footways), the Turnpike deployed a MicroTrenching technique, saw-cutting a narrow slot for streamlined FuturePath installation. This method, which allows deployments to be completed faster, cheaper, and with less overall disruption to road users, was ideal for the Turnpike's rocky terrain.

"[Our new 220-mile network] will produce a fiber-optic infrastructure that will become an essential element for roadway monitoring and surveillance, allowing us to enhance safety and improve incident response on our system as well as set a foundation for rural broadband. It's an important component of the PA Turnpike's continuing efforts to move our intelligent transportation systems forward and to prepare for connected and automated vehicles to benefit not only our customers and employees, but also emergency responders and neighbors."

Mark Compton, CEO of the Pennsylvania Turnpike Commission

APPROACH 2

Collaborate across the ecosystem to improve outcomes

To expand connectivity as fast as possible, the entire ecosystem needs to come together in new ways. Everyone stands to benefit with new collaboration strategies that reduce up-front installation costs, accelerate ROI, and make it easier to compete in the market.

Here are three key areas of innovation:

ONE

Open Access Networks

Deploying fiber networks takes time, causes disruptions, and can have significant cost. Because of this, there's been a growing trend in opting for open access networks. Open access networks are a single network in which multiple – and even competing – operators can rent fiber or duct capacity from a “neutral” host.

Governments and regulators worldwide are encouraging this model because it:

- Removes barriers to entry for non-incumbent operators.
- Avoids overbuild, so the same streets aren't being dug up repeatedly.
- Reduces the strain on permitting departments.
- Drives competition (which often leads to better service and lower prices for consumers).

Examples of Open Access Networks

The U.K.'s PIA System

In the U.K., Openreach's network of ducts and poles is available for commercial use at a fair market rate under the Physical Infrastructure Access (PIA) system. The result is a flourishing "alt-net" sector where 150+ competitive operators have sprung up, are growing (as a sector) at 100% per annum, and are expected to deliver at least 1/3 of the U.K.'s full-fiber infrastructure.



California Department of Technology (CDT)

In California, the governor recently signed historic broadband legislation to expand the state's fiber infrastructure, including a \$3.25 billion investment for an open access state-wide middle-mile network. In some cases, the middle mile – which is the mid-section of infrastructure between the core network (e.g., a central office) and the last mile that connects individual premises to broadband services – may be owned by a single major ISP, driving up prices for any competitive operators who want to connect. For others, there simply isn't a middle-mile network close enough to connect last-mile infrastructure. In response, the CDT is building high-capacity fiber lines across California that will be available to any public or private organization on a wholesale basis at fair commercial rates to remove a major barrier to entry and accelerate much-needed connectivity for underserved communities.



TWO

Dig Once Policies

Governments worldwide are implementing Dig Once policies as a solution to overbuilding, addressing the need for more efficient solutions when it comes to administration and permitting, labor and design, as well as environmental impacts.

These policies allow government agencies to coordinate this development so all broadband needs are addressed – and installed – at once. It can even serve as a revenue stream for local governments because pathways can be leased to private organizations, including communications providers.

FuturePath, which are flexible, scalable MicroDuct bundles, can be installed as part of other public works projects, such as:

- Planned highway expansions and maintenance.
- Utilities maintenance – including gas, water, and electricity.
- New road construction or lane expansions.
- Cycling lane and sidewalk construction.
- New housing development.



How can local governments implement this?

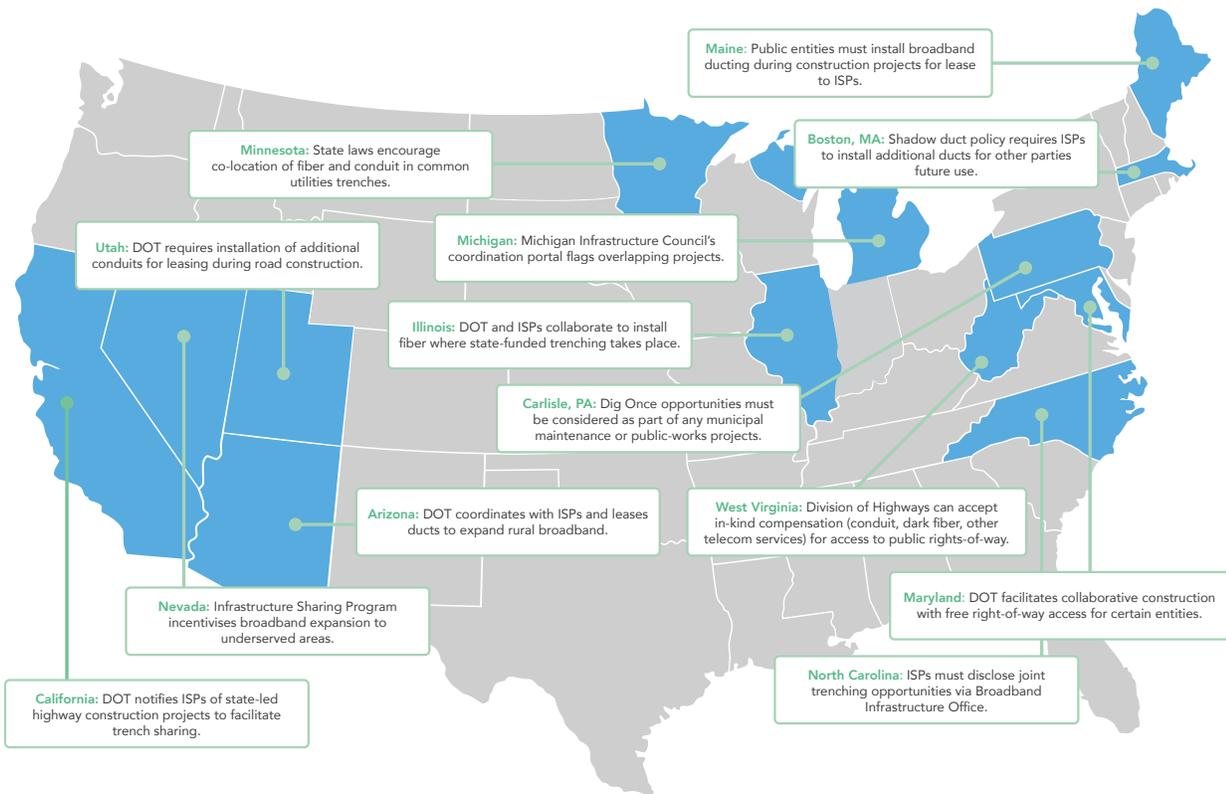
Determine and encourage the use of common utility corridors and implement a bundled MicroDuct system at the same time.



Examples of Dig Once Policies

U.S. Dig Once Policy

Across the U.S., government officials are implementing Dig Once policies. At the same time, excavators are being deployed on roads, bridges, and railways to create new rights of way under the Infrastructure Investment & Jobs Act. The key to maximizing this opportunity, while adhering to Dig Once policy, is implementing new digital infrastructure, while these capital projects are already in progress.



Zayo

Zayo recently took advantage of Nevada's Dig Once policy on a project to connect the state with the Pacific Northwest region. Zayo is the world's largest independent provider of communications infrastructure and this route, which runs along Interstate 50 (I-50), will service ISPs and cloud providers, as well as organizations in the financial and healthcare industries. The Dig Once policy has allowed Zayo, and other utilities with a Certificate of Public Convenience and Necessity (CPCN), access to the right-of-way during planned construction on the interstate. By sharing the cost of excavation, Zayo has reduced its capital expenditure and is now considering opportunities to share access and assets elsewhere in the U.S.



THREE

New Collaboration Models

Using a co-investment model is another way to reduce building costs and potentially provide a faster ROI.

Co-investment models bring two entities together to share the initial cost of the infrastructure build, and then share the resulting profits or effectively run separate networks.

In addition to public-private partnerships, companies with complementary existing footprints (and customer bases) are forming joint venture partnerships and investing in MicroTechnology as the ideal physical network layer for their joint infrastructure.

Similarly, right-of-way sharing is an ideal strategy for rural networking, where costs tend to be higher. Multi-path MicroDuct bundles make sharing even easier since each operator can maintain physically separate links.

Examples of New Collaboration Models

Vodafone and Altice (Germany)

Vodafone and Altice are creating a joint venture called FibreCo, which will upgrade and deploy FTTH for up to 7 million homes across Germany over 6 years.

Telecom Italia and Open Fiber (Italy)

Telecom Italia signed an agreement with the state-backed Open Fiber to accelerate its fiber rollout to rural regions of Italy, which is being financed with the help of public funding. The shared aerial rights of way development will bring broadband to at least 500,000 homes.

APPROACH 3

Tap into infrastructure that already exists

There is significant untapped connectivity potential in existing duct assets. Revitalizing them with MicroTechnology bypasses some of the major challenges facing network expansion, since they usually have lower labor and material requirements compared with new-build infrastructure.

Utilizing existing ducts with a MicroDuct override.

This approach involves installing one or more loose MicroDucts into an existing network – even alongside existing cables.

As well as allowing operators to utilize otherwise dead space while creating new pathways, this puts off the additional costs and hassle of digging and can completely remove the need for permitting as no construction is required (but accounting for traffic management may be necessary for a short period of time).

A single project could increase fiber capacity by 400% by leveraging the power of micro cables.

Benefits of rejuvenating existing infrastructure with MicroTechnology:

- No digging
- Lower cost
- Fewer/no permits required
- Instant additional fiber capacity
- Faster project timelines



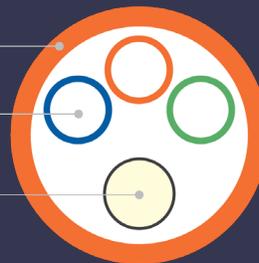
Customer Outcomes:

With over two decades of experience completing OverRides, Dura-Line has worked with a multitude of customers to apply this technique in various instances, including dense urban settings, intercity metro areas, and transcontinental networks – resulting in quick installation timelines and millions of dollars in cost savings.

2 in. duct

16/13 mm MicroDuct (x3)

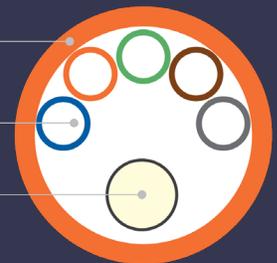
18 mm cable



2 in. duct

12.7/10 mm MicroDuct (x5)

18 mm cable



The number and size of MicroDucts installed in an OverRide is determined by fiber count and network routing requirements.



Reusing spare capacity in public sector assets.

Public sector organizations often have ducts they use for CCTV, traffic signaling, or ICT infrastructure. And, within those ducts, there's often spare capacity.

These ready-made routes could be leveraged for new projects, enabling operators to unlock new revenue streams from existing dormant assets or accelerate smart city ambitions.



Light Blue Fibre Ltd.

A joint venture between the University of Cambridge and Cambridgeshire County Council, has made their extensive duct and fiber networks commercially available for telecom companies, infrastructure providers, and other technology businesses on a wholesale basis.

Utility Companies Entering the Telecommunications Space

Many utility companies, including power, gas, and water providers, already own the existing right of way in their respective territories, creating an opportunity for them to deploy fiber infrastructure at the same time as their utilities. Some simply provide backhaul for telcos, but others are capitalizing on their existing infrastructure and customer service capabilities to offer broadband services as well. As the most flexible and scalable infrastructure available, MicroDucts are an ideal solution for utility companies looking to diversify their business by monetizing existing assets.





PNM Resources

PNM Resources (PNM) generates and distributes power to around 800,000 homes and business in New Mexico and Texas. Through years of new build construction, rebuilding, and reconductoring, the company's standard practice was to install only enough fiber to operate the grid. This typically took of form of a standard cable in a 1½ inch conduit, or leased third-party capacity services.

But when the time came for grid modernization, so too did a need for greater fiber capacity across PNM's extensive service area. Dura-Line worked with the company to devise a more scalable approach, based on FuturePath 7-way installed in existing underground easements.

This not only helped PNM to modernize its existing grid with ease, but also allowed the company to move all third-party capacity services to its own network and futureproof its infrastructure for unpredictable capacity demand and business needs.

"We are currently working on several large new fiber plant construction projects. With uncertainty around our final fiber strand requirements, FuturePath gives us space for future growth without additional construction cost. Whenever we need more fiber, jetting micro cables into dedicated MicroDucts is quick and easy."

Cornelius "Cork" Vanderford,

Manager, Telecommunications, PNM Resources

Expanding Connectivity and Competition in Multi-Dwelling Units

Fiber is needed everywhere – outdoors and indoors. Limitations to through-wall Wi-Fi improvement and predicted shifts to optical computing are driving the need for in-home fiber. MicroDucts provide the same flexibility, scalability, and upgradability within a building as you’d have outside it. They also provide additional protection and performance over direct-installed cable, making them the ideal infrastructure for multi-operator indoor networks, like multi-family apartments and office spaces.

New FCC rules

The FCC has recently adopted new rules to give tenants in U.S. office buildings and apartments more transparency, competition, and choices on their broadband service. By using MicroDuct permanent protective pathways over direct-installed cable, organizations can satisfy competition rules while expanding to meet future capacity needs.

MicroDucts are also the most future-fit connectivity infrastructure solution for the following in-building applications:

- Single-family homes
- Office buildings
- Hotels
- Data centers
- Airports (and other transport hubs)
- Stadiums
- Malls (and other retail developments)
- Tunnels (and other confined spaces)

Customer Outcomes

Dura-Line works with a leading real estate developer with a footprint of over 100 million square feet, mostly in Southern California. The company continually invests in technology to make its operations more efficient and sustainable, and provide its residents, customers, and guests with the best possible experience. This led the developer to adopt FuturePath from Dura-Line for broadband deployments across its portfolio, delivering the optimum combination of performance, longevity, and choice.



The Future is Bright

Technology is moving at lightning speed, but having the right networking infrastructure in place makes it easy to keep pace. By shifting from traditional networks to scalable designs, collaborating across the ecosystem, and tapping into existing infrastructure, operators can implement sustainable, scalable solutions that reduce excess digging (and the costs associated with it) and create networks built for everyone, everywhere.

How Dura-Line Can Help

- With over 50 years' experience helping customers across the globe in telecommunications, transportation, and network electrical markets, Dura-Line has a long-standing reputation for the safety, efficiency, and durability of its products and installations.
- Dura-Line is a global leader in MicroTechnology – with solutions like MicroDucts and FuturePath – that empower operators to create future-ready, multi-use networks to support whatever comes next.
- Dura-Line helps customers tap into existing infrastructure, using techniques like OverRides to minimize labor and material requirements – resulting in reutilization of dormant assets, reduced installation costs, and faster time to market.
- Dura-Line Academy provides industry-leading training and education to help operators design, deploy, and maintain networks flawlessly around the world.

With demand, funding, and appetite aligned, now is the time to seize the moment and invest in network infrastructure. Learn more about how Dura-Line is providing innovative solutions to support connectivity across the globe.

Next Steps:

- Explore our full catalog of products at duraline.com.
- Take a look at our digital tools and calculators at duraline.com/tech-center/digital-tools/.

Still have questions?

Contact us at moreinfo@duraline.com.