FiberLight

DARK FIBER

IS IT RIGHT FOR YOU?

FiberLight

ULTIMATE CONTROL • SCALE • SECURITY

Demands on Enterprise Networks are Increasing

Demand for network bandwidth is increasing, with no end in sight. Statista projected the total amount of data created, captured, copied, and consumed globally is forecasted to increase rapidly. By 2025, global data creation is projected to grow to more than 180 zettabytes.

Typical Network Issues You May Be Facing

Unpredictable and Increasing Network Demand

Network demand is growing, partially due to organic growth but also to the addition of new devices and digital experiences like streaming sports events and remote work. These new user expectations are creating demand that's unpredictable in volume and timing.

Need for Low Latency

New network use cases, such as video conferencing, autonomous vehicles, industrial robots and smart cities are creating a need for low latency network services.

Security, Availability, & Uptime

Network challenges in security compliance on shared networks and the impact of other users can compromise available bandwidth and application performance. The expectation today is that networks will be highly available.

In today's on-demand world, having control over your own network is "table stakes." It allows you to control cost, time to market, revenue, and profit. Controlling your network enables you to scale. In these uncertain times and business conditions, you need the ability to change the size and scale and business functionality of your network. You might have to scale to meet the network effects of cloud services like Azure, AWS, Google, remote workers logging into Office 365, Salesforce or Zoom conferences. Or, you might want the ability to launch hybrid applications from a typical headquarters as well as third-party data centers and into the cloud.

With network challenges related to escalating bandwidth, latency, security, and financial demands, many companies are turning to dark fiber to save money while creating future-proof networks for their operations.

Impacting Factors

The sheer amount of new data being moved around the network each day – gigs, terabytes, petabytes, or more

Whether the network team is equipped with optical transport engineers or dedicated network professionals

Applications requiring the highest amount of flexibility and shortest response times

The business struggles to plan for capacity or has very fluid needs

What is Dark Fiber?

Put simply, dark fiber is typically pre-existing underground infrastructure that does not yet have the hardware or software that enable it to run services. While fiber optic cables that are actively sending data via light wavelengths are considered lit, the rest of the unused fibers lying in wait are deemed unlit—or dark.

A Little History

To get to the bottom of dark fiber, we have to travel way back to the 1980s and '90s when the initial fiber installations were occurring. Historically, dark fiber was purchased by other service providers or only the largest of companies. The glut of fiber from the late 90s and early 2000s has driven prices down and moved dark fiber into the realm of possibility for conventional companies, not just telecom carriers.

It's important to know that the majority of the cost in laying fiber cables isn't wrapped up in the cable itself but instead comes from physically digging down to plant the fiber. Foreseeing the need for growth in the future and not wanting to repeat the expense, time and difficulty of digging back down, the companies that were building fiber footprints during this time laid far more fiber than they actually needed. The same pattern applies to fiber builds that came later, each adding to the excess. The surplus of infrastructure these companies left is today's dark fiber, which can be bought or leased by other business entities. Some providers will build new dark fiber for businesses as well.

New VS Old Fiber - Does It Matter?

If we're talking the '80s and '90s, that means some fiber networks have been sitting in the ground for 30 to 40 years. While optical fiber is inherently more fragile than copper, the way it is constructed was made to stand the test of time over copper cabling—glass fibers, connectors sealed from dirt in patch panels, and splices sealed in enclosures that prevent moisture from entering.

Barring cable damage and water ingress, the design life of fiber cables back in 1985 was engineered to be approximately 28 years. The limiting factor was the long-term stress on the fiber and the largest flaw on the fiber surface.

The resulting benefit is that on shorter runs on older fiber, you can still get excellent signal to noise ratios. This means that all the fiber placed a couple of decades ago that companies were worrying about needing to replace is still chugging along, just fine, albeit for shorter distance needs.

Degradation Over Time

When fiber optic networks were first installed, some users inspected them, probably out of curiosity, causing problems by allowing dirt to contaminate connectors or overstressing components by handling them. But the biggest risk is water penetration into the splice box, where, over time, it will cause faults because water will affect the fiber and reduce its transmission level. And, in some cases, when splicing old cable, the gel, which covers the fiber, may be dry and will not allow the fiber to flex as it normally would. This makes splicing complicated and leads to higher attenuation in the place of the splice.

With a standard lifespan of 20-25 years, standard 'wear and tear' of systems regularly degrades the quality. Over time, fiber degrades and weathers just like any other material. As optical fibers age, there's more decibel loss, dispersion, and refraction, but we also know that you get that as frequencies go up and distances increase. There's been a huge amount of work since about 1998 on solving for these conditions.

In this high-capacity, instant gratification world, the older the fiber, the less lit capacity you can get out of the glass. For example, some providers are not able to turn up 100G on older dark fiber over long distances. Because of the age of the glass in this case, 10G was the limit for lit capacity.

Why New Is Likely Better

The best practice is to look for providers offering newly constructed dark fiber. Capacity aside, newer fiber is not spliced as much as old fiber, just by virtue of time, and is likely optimized to run by the right locations due to shifts in commercial developments over time. This results in more latency-specific routes between data centers or towers.

In the end, 20- or 30-year-old dark fiber in the ground will be challenged to support the decibel loss requirements of today's networks. Fiber counts may also be lower than today's high capacity ribbon cables. Ask your potential provider to run decibel loss stats for dark fiber and ensure they meet your requirements.

Four
Advantages
of Dark Fiber

Scalability & Flexibility

There are many advantages associated with a dark fiber strategy, starting with its scalability and flexibility. A huge benefit of dark fiber is its ability to be broken down into a multitude of wavelengths through a process called wavelength-division multiplexing (DWDM). DWDM enables the transmission of multiple data streams along different light wavelengths, similar to how multiple planes can travel the same route simultaneously when flying at different altitudes. This means that businesses with smaller needs can get by just leasing a single wavelength, while larger companies can lease an entire fiber strand. Dark fiber can also easily accommodate the rapidly-scaling needs of today's businesses.

Increased Performance

Dark fiber also showcases remarkable ability when it comes to speed. Nowadays, in sectors such as financial services, especially where algorithm-based trading is involved, latency is paramount. When selecting dark fiber, enterprises can ensure they are getting the most direct, and therefore most efficient, path from end-to-end. Dark fiber also offers private networking, which means that businesses can quickly identify issues themselves and remedy them without waiting for managed network providers to resolve the roadblocks.

Predictable Cost Structures

In addition to enabling businesses to tailor costs based on wavelengths and strands, dark fiber also boasts a better cost structure for higher bandwidth needs when compared to traditional Internet Service Provider (ISP), managed private network, or wavelength payment approaches. ISPs usually charge by the bandwidth, meaning as your bandwidth increases, so do operational expenses. After a certain point of network growth, this arrangement starts to make less and less financial sense. Once a business requires multiple wavelengths with a forecast for more growth, dark fiber's fixed payment with unlimited growth capacity becomes a better option for larger or expanding businesses than the cost of traditional commercial service. This is especially true if the business expects more growth in the future.

Security & Redundancy

According to IDC, 53 percent of businesses have either brought or are thinking about bringing cloud workloads back on-premises to enhance security and performance. Dark fiber's physically private networks also present a great option for companies looking to improve their security postures. Greater security arises with dark fiber because businesses have control over the hardware in-house and lease their own dedicated fiber or wavelength.

Sending data through a private network is generally more secure than going through the public internet or shared networks because the data remains under the control of a single entity. Dark fiber offers safety in the form of augmented redundancy. Point-to-point connection and marked communications conduits underground help to safeguard dark fiber against many of the common types of outages that result from third-party damages. Additionally, when businesses depend on utilizing two different providers as part of their disaster recovery plans, there is a chance that those two providers, while separate in name, use overlapping infrastructure. When businesses work with dark fiber providers for an architecture to meet their availability requirements, this risk is averted.

Dark Fiber Contracting Options

The options to have your own dark fiber network vary based on the provider; however, the most common is a dark fiber lease. If you are looking for flexibility and a lower cost to get your dark fiber network up and running, a lease gives you the control you need with minimal upfront costs.

For customers that have the funds to spend upfront and want smaller annual payments, an indefeasible right of use (IRU) would be the option to consider. This gives you better long-term value and allows you to account for dark fiber as an asset under generally accepted accounting principles (GAAP).

LIT WAVELENGTHS VS DARK FIBER
How to Choose?

Why Companies Choose Waves:

- Dark fiber isn't available, or construction is too costly

- They are short on IT staff

- Their staff has little optical transport expertise

- They are already 100% outsourced

- They would rather have one entity accountable for their network vs flexibility

Why Companies Choose Fiber:

- They are replicating or moving more than 10G per day of NEW data

- They have multiple applications at a data center that require large bandwidth

- They have optical transport experience in house

- They require the most flexibility and shortest response times

- They have Cap-Ex budget available

- They can't plan for capacity and have very fluid needs
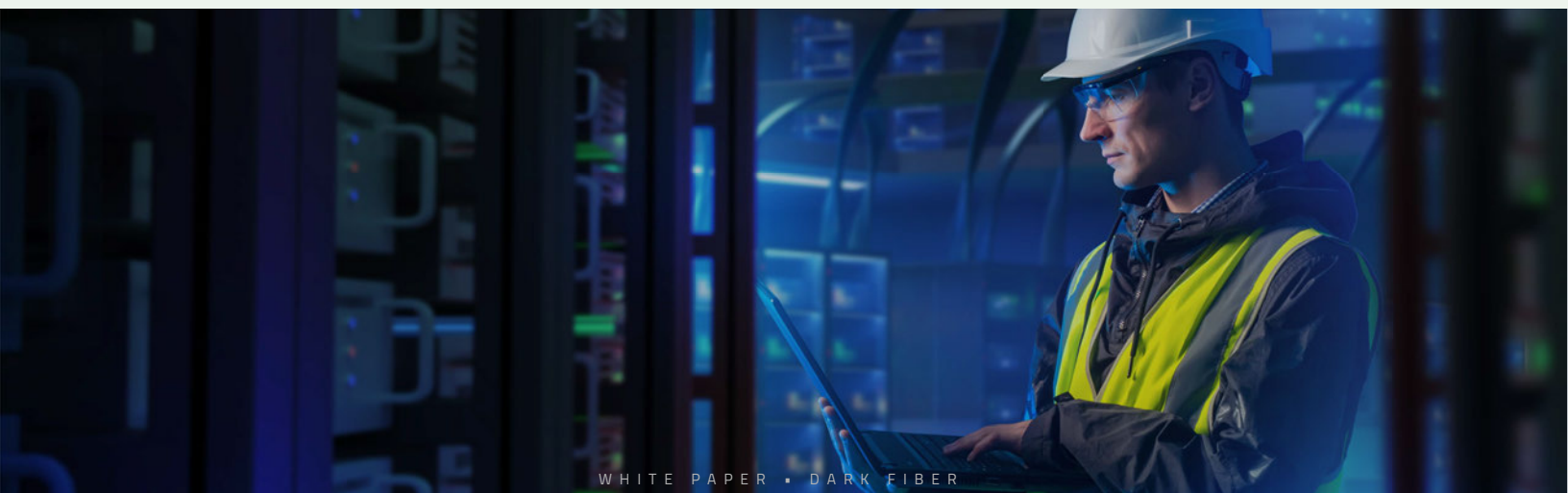
Don't Just Take Our Word For It...

Dark Fiber Transforms
e-Learning, Campus Security & Campus Connectivity

Amarillo, TX

The Amarillo Independent School District (AISD), based in the city of Amarillo, Texas, spans nearly 70 square miles of land in Randall and Potter Counties, with 58 locations serving over 32,500 students. Their network of locations encompass every phase of the K-12 learning lifecycle as well as specialized instruction locations.

Due to changes in the Texas State Legislature funding at the time, AISD's current network service charges were increasing from $14,000 per month for 1Gpbs connections to almost half a million. With its existing infrastructure, the level of robust bandwidth and on-site hosting capabilities necessary to support these learning and security measures was unavailable and not financially viable.

To position AISD for long-term growth, deliver network agility and control, enable student access to digital opportunities, enhance security and pave the way for new developments, FiberLight was chosen to deploy a 70-mile dark fiber network expansion.

With the FCC's Category 1 E-rate program and the Texas State Legislature's matching funds, the dark fiber network buildout was 100 percent subsidized. With networking equipment also eligible under Category 1, 80 percent of the equipment was covered as well.

The highly capable and reliable network environment, provisioned by FiberLight, met each of the district's unique goals by enhancing the AISD network across its entire footprint with greater control, bolstering security and high-capacity connectivity.

Leveraging Dark Fiber for
Increased Citizen Engagement & Digital Government Initiatives

Roswell, GA

The city of Roswell, Georgia, a suburb of Atlanta, is the state's eighth-largest city and home to almost 95,000 residents. Digital municipal and administrative services are a pillar of Roswell's community, enabling residents to take on-the-go advantage of everything from crime reporting, emergency response and public safety apps to parks and recreation applications, mobile utility billing and beyond.

Roswell chose FiberLight to design and deploy an additional dark fiber ring to support residents' next-generation capabilities and provide heightened network performance, bandwidth, speed, redundancy and security. Having served as a dark fiber provider for elements of the community's network since 2006, FiberLight was already familiar with the area's network. There was a history of ongoing support and close partnership, along with the ability to provide the ideal network solution with its presence in an adjacent data center.

Dark Fiber Strategy on an Urgent Timeline

Roswell determined that it urgently needed a dark fiber strategy that would enable it to leverage high-capacity connections to a geographically advantageous data center on a short timeline. The city already had sites with access to a dark fiber ring. However, the future of application efficacy for the locale depended on quickly establishing a powerful but simplified infrastructure environment capable of supporting the increasingly complex needs of municipal departments, applications, services and associated data with scalability, security and optimized performance.

A Robust, Resilient Network Paves the Way for Future Growth

With expanded infrastructure delivering high-capacity connectivity to a secure and scalable data center environment, the city of Roswell could quickly enjoy the always-on environment it needed to support its citizens and the services they depend on. This dark fiber network solution, deployed on a short timeline, enabled the city to leverage greater control, provision more reliable services for the community and support future expansion with added agility and security.

New Dark Fiber

E-Learning Provider Amplifies Potential

Florida-based online education program

A Florida-based online education program services provider, which partners with top universities across the U.S. and reaches more than 50 campuses, provides a great example of how enhanced networking is key to success.

Network Constraints Hinder Business Success

With more than 500 employees across two locations, the company found that its operational and call center network, which featured Digital Signal 3 (DS3) coaxial cable connecting to its remote data center and dark fiber to connect to the company's individual locations, was being taxed by an influx of daily email. The use of differing types of connectivity, together with dark fiber, was unregulated and un-permitted, and the varying bandwidth speeds from one type of network to another resulted in data traffic creating a bottleneck to its data center. This hindered operations and business performance.

The interruption led the digital learning provider to transition its network to Ethernet for multipoint connectivity over a metropolitan area network (MAN). However, it still experienced issues with network performance, particularly when the ethernet provider's network interface device (NID) failed, interrupting their operations even further. After a period of trial and error, the company determined that it was in need of a solution partner that could help them achieve a "control-your-own-destiny" network approach, leveraging a reliable mix of dark fiber, dedicated internet access (DIA) and fixed wireless connectivity solutions.

Dark Fiber and Cloud Combine for Ultimate Control

FiberLight provided a two-tiered network approach to help the online education services provider achieve accelerated performance, augmented control, increased scalability and better security. To start, FiberLight helped the company switch over to a privately-operated dark fiber ring. This dark fiber solution allowed the company to customize and future-proof its network, gain control of the equipment it was using, and leverage 10 Gbps capacity as opposed to their previous 100 Mbps. The company also set up a thorough disaster recovery plan to ensure business continuity with internet carrier diversity. They implemented Border Gateway Patrol (BGP) management between providers for improved performance and failover assurance. FiberLight's fiber network ring included a 24-count fiber link to the back parking lot at one of the company's locations. In the event that the network was disrupted for any reason, it offers the option to bring trailers in to hook everything up on-site to bring the network back up. This capability is extremely important in the hurricane-prone Florida area.

The second part of the solution involved shifting the company's telephony operations to the cloud. By utilizing a hybrid cloud solution featuring Azure site recovery services for disaster recovery and Amazon Web Services (AWS) for long-term backup storage, the company reduced their storage infrastructure costs from $1.6 million to $200,000 annually. To get to their cloud, the company turned to FiberLight's Cloud Connect for a low latency, secure and private connection to their public clouds. Cloud Connect enabled the company to experience greater peace of mind with more secure operations while opening up opportunities for new international clients that can leverage AWS servers throughout the world.

Whatbox Provisions Dark Fiber
for Virtually Unlimited Capacity and Redundant Data Center Connectivity

Whatbox Inc. specializes in Software-as-a-Service (SaaS) solutions for high-speed network applications and global content distribution. As a result of accelerated data demands due to COVID-19, Whatbox was experiencing a dramatic increase in usage from individuals and teams utilizing the internet to share media and content virtually. To ensure the company could meet these requirements and have room to expand further into the future, FiberLight quickly supplemented the company's existing 100Gbps lit wavelength network by provisioning redundant dark fiber connectivity between their data centers in Northern Virginia.

This enabled Whatbox to light their own 400Gbps waves as needed. The dark fiber provides nearly limitless scalability and increased control, empowering Whatbox to grow more cost effectively than they could with lit circuit leasing options. The expedited dark fiber deployment was in place and turned up in the span of just two weeks.

"After doing thorough research into the providers and solutions on the market, we knew FiberLight was the provider that would deliver the flexibility, quick turn-up times and cost efficiency we needed to meet requirements now with the ability to scale quickly into the future," commented Anthony Ryan, Chief Executive Officer of Whatbox. "As we look into possibly moving data centers, FiberLight went the extra mile to offer a flexible solution that allows us to relocate fiber over time as we continue to evolve to best serve our customers."

GROW YOUR
HIGH-PERFORMANCE NETWORK
with a reliable fiber infrastructure

Is It Time to Consider Dark Fiber?

While dark fiber may be regarded as something that is only for service providers, or maybe even for large enterprise companies, it is being purchased more commonly these days than many businesses would assume. Able to meet a wide variety of business needs, this network strategy effectively future-proofs businesses, empowering them with the ability to meet the growing needs of their end-users with bolstered bandwidth, reduced latency, and more. While setting up a dark fiber system can admittedly be intimidating at first, choosing an experienced provider who can serve as a trusted partner to design, build, and deploy a custom network will offer businesses peace of mind while addressing current and future network requirements.

Dark Fiber Network Assessment

Is dark fiber right for your organization? Find out which high-bandwidth, low-latency connection is best for you. Explore cutting vendor costs and reducing timeframes while managing changes to your network. As data and bandwidth needs are exploding—take 60 seconds to explore future-proofing your bandwidth needs with virtually unlimited capacity.

About FiberLight

Your network is in good hands. With 20 years of dedicated experience designing, engineering and optimizing large-scale fiber networks, you can trust our regional expertise and enjoy higher-touch, personalized account management and dependable customer service. Plus, take advantage of new fiber—built in the last three to four years—diverse from ILEC and Cable MSO providers on a fully owned, operated and managed network, built completely through organic growth.

Choose a stable provider with the flexibility to partner with you to design the network you need to take your business to the next level.

Every custom solution starts with a conversation.
Learn More: fiberlight.com or call 844-509-0775

FiberLight builds and operates mission-critical high bandwidth networks to ignite our client's digital transformation. With approximately 17,000 route miles of fiber networks and 230,000 pre-qualified near-net buildings, FiberLight operates in over 430 cities in the U.S. Our service portfolio includes high-capacity Ethernet and Wave Transport Services, Cloud Connect, Dedicated Internet Access, Dark Fiber and Wireless Backhaul serving domestic and international telecom companies, wireless, wireline, cable and cloud providers as well as key players across enterprise, government, and education.