

SOLUTION BRIEF

Single Fiber Networks

Extend Your Network by Reducing Your Fiber

Drivers for Fiber-based Networks

The motivations for building an optical network with dark fiber are varied and several, and depend quite a bit on the type of organization.

Service providers do it because they want to expand their coverage area but the time, expense and complexity of deploying their own fiber is prohibitive. Large enterprises with extensive connectivity needs may want

to lower their networking costs by replacing managed services. Healthcare organizations may want to take advantage of the network security dedicated fiber provides to comply with governmental regulations while financial services firms may want to increase capacity and lower latency to reduce transaction times and increase network reliability.

Facts & Figures:

- It is estimated that there are over 1 billion Km of optical fiber deployed globally
- The global dark fiber networks market is worth over \$5B today and is forecast to grow to over \$11B by 2026 ¹
- The cost of dark fiber can range anywhere from tens of dollars per month per mile to several thousands of dollars per month per mile depending on your application and location
- For a simple, point-to-point network, fiber costs can account for as much as 75% of the annual infrastructure costs² (see Figure 1).

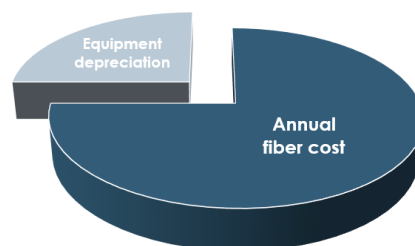


Figure 1 - Annual infrastructure cost ratio

¹ <https://www.credenceresearch.com/report/dark-fiber-networks-market>

² Based on 100km network at \$50 per Km MRC on a 5-year lease and \$100,000 equipment cost depreciated over five years

The Challenge

Obtaining dark fiber has become more difficult over the last 10 to 15 years due to massive consolidation of the industry. Consider that:

- In the mid-2000's there were dozens of fiber providers in the US
- Many were smaller, regional players with a footprint in a single geography
- Since then, these fiber assets have become concentrated under the control of only a handful of players
- Zayo Group alone has acquired the assets of over 40 competitors in multiple geographies since 2007—including Europe and Canada—allowing it to control a vast majority of the market
- While the situation is less concentrated in Europe, incumbent telcos still control approximately 50% of the fiber and regulatory attempts to unbundle fiber have been slow to unfold

So, what can you do if fiber is scarce or too expensive?

- Single fiber networks provide the same performance and reliability at half the cost
- They operate at reduced channel count but using high speed coherent channels can replace the lost capacity
- Single fiber networks offer a viable alternative where a standard dual fiber network is not an option.

Impact

Whether you gain access to fiber via purchase, lease or indefeasible right of use (IRU) will impact your cost model and, ultimately, your network design. Other considerations affecting your design include:

- Application mix
- Route diversity
- Service protection

Even with two fiber strands, route diversity and 1+1 service protection require the ability to send and receive on different routes using a single strand. Likewise, supporting both metro and long haul traffic on the same network you will need a separate strand for each.

The Ekinops Solution

Ekinops has long been a pioneer in developing optical transport systems for single fiber applications. By dividing the C-band channels into red and blue sub-bands using specially designed optical filters (MUX/DEMUX), each sub-band can be configured to transport up to 32 separate wavelengths in opposite directions. Bi-directional optical couplers groom the aggregated signal from the MUX/DEMUX onto and off of the fiber (see Figure 2).

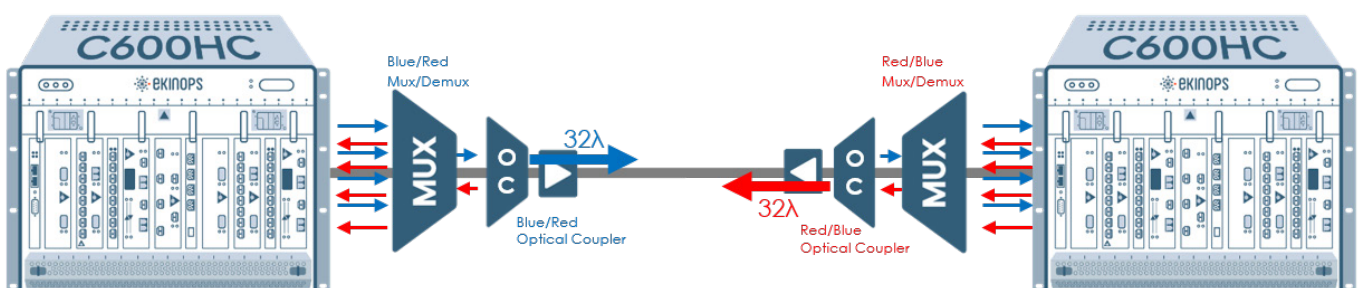


Figure 2 - Ekinops single fiber operation

All Ekinops transponders and muxponders from 10G to our FlexRate™ modules that operate a line rates from 100G to 600G are capable of single fiber transmission using different wavelengths in each direction—equivalent to 1,920 10G services.

At 10G, the transmit lasers on either end are tuned to different wavelengths and wideband receivers are used that are capable of accepting any incoming channel. For coherent channels from 100G to 600G, Ekinops uses a dual laser architecture in which the receive-side laser acts as a local oscillator that can be tuned to the same frequency as the incoming channel (see Figure 3).

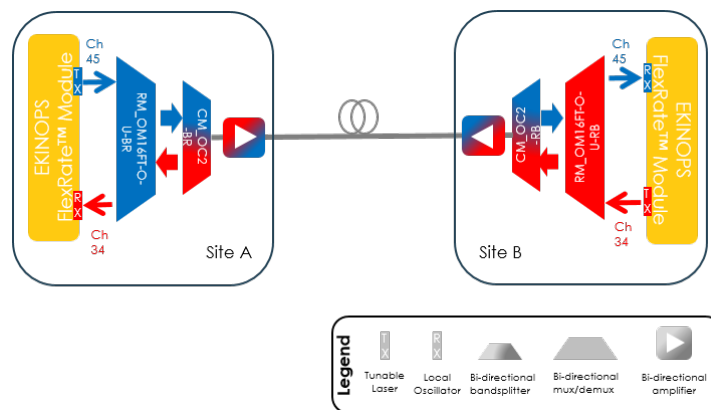


Figure 3 - Ekinops FlexRate™ dual laser architecture

Features

Ekinops offers a complete line of single fiber capable products including:

- CWDM & DWDM multiplexers/de-multiplexers
- CWDM & DWDM optical add/drop multiplexers (OADM)
- Bi-directional optical couplers
 - Pluggable Modules (PM) for C200HC and C600HC chassis, or
 - Cassette Mounted (CM) using a passive rack mounted (RM) shelf
- Variable gain amplifiers
- Transponders/muxponders
 - 10G: Wideband receivers
 - 100G-600G: Dual laser architecture

Conclusion

Service providers and enterprises of all types are looking for ways to keep the cost of network expansion and new networks builds to a minimum. Acquiring fiber makes up a substantial portion of that cost and in an increasingly consolidated fiber market, it can be difficult to find affordable fiber.

Single fiber networks can cut the cost of fiber acquisition literally in half or, alternately when each strand of a dual fiber network is used in single fiber operation, can provide network redundancy and protection. In the case of service providers, they also provide a way to double the revenue-generating potential of a dual-strand fiber link by running each independently in single fiber operation.

Whether at 10G or coherent 100G+ line rates, Ekinops solutions—the result of over a decade of experience with single fiber deployments—deliver the most cost efficient approach to getting the most out of your fiber plant.

About Ekinops

Ekinops is a leading provider of open and fully interoperable Layer 1, 2 and 3 solutions to service providers around the world. Our programmable and highly scalable solutions enable the fast, flexible and cost-effective deployment of new services for both high-speed, high-capacity optical transport networks and virtualization-enabled managed enterprise services

Our product portfolio consists of three highly complementary product and service sets: Ekinops360, OneAccess and Compose.

EKINOPS360
Dynamic Optical Transport

- Ekinops360 provides optical transport solutions for metro, regional and long-distance networks with WDM for high-capacity point-to-point, ring and optical mesh architectures, and OTN for improved bandwidth utilization and efficient multi-service aggregation.

ONEACCESS
Fast Network Virtualization

- OneAccess offers a wide choice of physical and virtualized deployment options for Layer 2 and Layer 3 access network functions.

COMPOSE

- Compose supports service providers in making their networks software-defined with a variety of software management tools and services, including the scalable SD-WAN Xpress.

As service providers embrace SDN and NFV deployment models, Ekinops enables future-proofed deployment today, enabling operators to seamlessly migrate to an open, virtualized delivery model at a time of their choosing.

A global organization, with operations in 4 continents; Ekinops (EKI) - a public company traded on the Euronext Paris exchange - is headquartered in Lannion, France, and Ekinops Corp., a wholly-owned subsidiary, is incorporated in the USA.

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