

Dark Fiber Lease Considerations

This memorandum presents a brief framework for pricing and marketing of dark fiber. With the obvious caveat that a detailed analysis requires an in-depth evaluation of a given project or market, this general overview may help you in determining such matters as how to price your dark fiber—for example, to balance encouragement of use (and opening up of the dark fiber market) and rationing of strands, while maximizing potential dark fiber net revenues.

1. What pricing models are used for dark fiber?

Most commonly, dark fiber is priced on a per strand per mile basis for a set term. Usually, the lease price is for fibers on the existing fiber network, and the customer is responsible for the incremental cost to connect their facility to the closest access point on the existing fiber route. Colocation, splicing, make-ready, and rack space costs are generally assessed on top of the fiber pricing. Some entities will also charge an up-front fee to cover administrative costs.

The following are a range of pricing structures found in both the private and public sectors.

1. Incremental or proportional cost (either of construction or maintenance). In this model, dark fiber is priced at the incremental or proportional cost of building the leased fibers or maintaining them. These structures will result in the lowest pricing possible. In our experience, this model is used only where the provider is under some kind of duress or legal requirement.¹
2. Up-front payment plus maintenance. Most commonly, dark fiber is leased as a 10- to 20-year (most often 20) Indefeasible Right of Use (IRU). The customer pays up front for the IRU and annually for maintenance.² The maintenance cost is calculated on route miles, not strand miles. The annual maintenance charge is the same per mile regardless of whether the lease is for 1 or 10 or 100 strands on the same route. The upfront payment covers the entire term of the fiber lease, but maintenance and colocation contracts typically are renewable and for 5-year or shorter terms, which allow for cost adjustments based on experience and inflation. The benefit of this model is the substantial inflow of funds early in the lease term, funds that can help bridge any potential early year cash shortfall while an entity is beginning operations and developing new services. On the other hand, the model will not result in annual revenues over the long-term beyond some of the cost of maintenance.

¹ For example, Minnesota Power offers dark fiber at a rate of \$13.65 per mile per strand per month under a ruling from the Minnesota Public Utilities Commission on a transaction agreement between Minnesota Power and Enventis Telecom Inc. (a non-regulated subsidiary of Minnesota Power). The ruling bases the lease price of Minnesota Power's unused fiber assets using an incremental cost basis.

² One of the benefits of this model for the customer is that the IRU can be treated as a capital expenditure and depreciated on an advantageous schedule.

3. Per annum or per month pricing. This structure has the benefit of delivering to the fiber owner a steady annual income stream over time, but does not deliver a large up-front payment that could serve to bridge a difficult budget year or finance new investment. On the other hand, this model is more achievable if the dark fiber lessee is not able to make a large up-front payment—but can pay for the fiber on a recurring annual or monthly basis. As a result, this model potentially increases the number of potential dark fiber customers. Net pricing over the term of the lease tends to be higher than in the up-front payment model over the same total period of time. This model is often used for short-term leases, and can deliver very high revenues for a short time—a nice bonus, but not necessarily the basis for sustainability of a network.

2. How is dark fiber generally priced?

Dark fiber pricing varies greatly among markets and, even in the same market, among carriers. Pricing is route-specific, location-specific, and sometimes plainly arbitrary. Commercial pricing frequently is based on a mix of factors: market competition in that location; market demand in that location; and the cost of building in that location. Non-profit pricing will frequently take the same factors into account but require less or no margin. Some of the higher education networks around the country, for example, base their fiber pricing on a construction and operations cost recovery model.

Generally, one can divide all fiber in the market into two categories for purposes of pricing, with some sub-categories: first, long-haul fiber and second, metro-area fiber.

Pricing in the metro-area market

Metro-area prices are almost always considerably higher (on a per mile basis) than long-haul fiber, which is less costly to build. Within the metro-area category, more urban routes will be priced significantly higher than routes in suburban and exurban areas, depending on the desirability of the urban market. Occasionally, an urban market will prove to be surprisingly cost-effective, usually because a glut of fiber has had the competitive impact of pushing pricing down.

Commercial pricing in major urban areas can range from \$2,000 per mile per strand up-front for a 20 year term to \$50,000, depending on the provider and whether river crossings or similarly complex routing is necessary. On a per month per mile basis, this equates roughly to \$15 to \$275. In cases where the full cost for construction is included—as it frequently is in the case of new commercial builds—the cost in our experience ranges from \$350 to \$6,000 per mile per month per strand—we frequently see bids from commercial providers that include construction costs at 10 to 20 times the cost of the IRU itself, depending on the number of strands required.

Pricing in the long-haul market

We find long-haul pricing to be more consistent than metro-area pricing, at least in the non-profit sector. 20 year IRU up-front prices will range from \$500 per mile per strand on standard long-haul routes up to \$2,000 to \$3,000 on the most desirable long-haul routes (such as between Los Angeles and San Francisco or along Interstate 95 on the East Coast). Commercial pricing will be on the higher end of this range; non-profit frequently in the middle or on the lower end.

The following are a range of prices, using a range of pricing structures, we've seen recently in the public and non-profit sectors. These and other examples are analyzed on a normalized basis in Table 1 below.

1. Up-front payment plus maintenance:

- a. A statewide backbone network in the Midwest is currently valuing (for purposes of in-community fiber swaps) rural fiber at \$750 per mile per strand on a one-time basis plus a proportional share of maintenance, currently set at \$150 per mile annually. As a result, for a pair on a 100 mile route, the total cost would be \$150,000 up-front, plus \$15,000 a year. For fiber in mid-size towns and suburbs, the cost is exactly double (\$1,500 per fiber per strand up-front), and in urban areas, double again (\$3,000 per mile per strand up-front). We believe these prices are dramatically below market.
- b. Another BTOP awardee in a joint rural/outer-suburban area is offering dark fiber pricing on 20-year IRUs for a one-time upfront charge of \$1,500 per fiber per mile and an annual recurring maintenance charge of at least \$250 per month per route mile. This pricing is consistent with (and based on) the pricing charged by the state's tollway authority in the state for fiber along its rights-of-way. We believe these prices are dramatically below market.
- c. MCNC, the education and research network in North Carolina, is also a BTOP awardee. Its grant application proposes an up-front dark fiber IRU price of \$750 per fiber per mile, based on a 20 to 25 year term, plus the proportional cost of maintenance (likely to be set at around \$200 per mile). MCNC senior staff tell me that these numbers are substantially below market and likely to transform the dark fiber market in North Carolina (which is explicitly part of MCNC's goal).

2. Per annum or per month pricing:

- a. A rural cooperative in an eastern state prices its dark fiber for members at \$45 per fiber per mile per month.
- b. A number of public utilities in small towns in rural areas of the Tennessee Valley use a schedule that requires payment of an upfront \$5,000 license

activation fee, plus \$1,000 to \$2,000 per fiber pair per mile annually. Discounts of 20 percent are offered for longer route lengths and for higher quantities leased (more than four pairs).

- c. Palo Alto Utilities offers dark fiber at per month per mile rates ranging from \$213 to \$425 for the first fiber, with additional fibers priced at \$142 to \$166. The effective rate for a pair is \$355 to \$591 per mile per month and \$177 to \$295 per fiber per month per mile (based on purchase of a pair). The lower prices within this range are offered based upon quantity, buffer tubes used, route length, topology, and length of term.
- d. Burbank Water and Power charges based on miles and length of contract. For one to six fibers, the cost is \$175 per fiber per year for a five-year term. The price decreases proportionally to \$135 per fiber per year for a 15-year term.
- e. In a very competitive urban market, a large municipal electric utility uses a declining scale and offers costs that are very competitive with the private sector. The cost is \$100 per month for each location, plus a per mile per month charge of:
 - i. \$300 per month per fiber strand for 1 to 10 miles
 - ii. \$180 per month per fiber strand for miles 11 to 20 miles
 - iii. \$120 per month per fiber strand for 21 to 30 miles
 - iv. For miles beyond 31, the rate is negotiated

As you can see, the units of pricing and structures can vary greatly. Table 1 summarizes the different examples and offers normalized pricing data. The table computes the effective rate for fiber leasing by taking into account the cost of maintenance for the up-front model and comparing prices on a per month and year, per strand basis, assuming purchase of a pair.

Table 1: Dark fiber pricing in a range of markets (based on per mile calculation)

	Term (years)	Up-front cost per strand	Maintenance cost per route mile per year	Price per month	Price per year	Effective price per month per pair	Effective price per year per pair	Effective price per month per strand (assumes purchase of pair)	Effective price per year per strand (assumes purchase of pair)
Long-Haul Routes									
CA rural/suburban	20	\$1,000	\$250			\$9.37	\$112.50	\$4.68	\$56.25
IL rural	20	\$750	\$150			\$6.87	\$82.50	\$3.44	\$41.25
IL rural/suburban	20	\$1,500	\$250			\$13.54	\$162.50	\$6.77	\$81.25
NC rural	20 to 25	\$750	\$250			\$7.29	\$87.50	\$3.65	\$43.75
MD rural	-	-	-	\$45		\$90	\$1,080	\$45	\$540
Metro-Area Routes									
IL suburban/small town	20	\$1,500	\$300			\$13.75	\$165	\$6.87	\$82.50
Burbank	5	-	-	\$14.58		\$29	\$350	\$14.58	\$175
	15	-	-	\$11.25		\$22.50	\$270	\$11.25	\$135
TN small town	-	-	-		\$500	\$83	\$1,000	\$41.60	\$500
TN small town	-	-	-		\$1,000	\$166	\$2,000	\$83	\$1,000
Large Urban Routes									
Palo Alto	-	-	-	\$177 to \$295		\$355 to \$591	\$4,360 to \$7,092	\$177 to \$295	\$2,124 to \$3,540
CA large urban	-	-	-	\$120 to \$300		\$320 to \$600	\$2,880 to \$7,200	\$120-\$300	\$1,440 to \$3,600
IL urban	20	\$3,000	\$600			\$27.50	\$330	\$13.75	\$165
VA urban	20	\$1,500 to \$2,000 (includes full construction cost)	-			\$100 to \$550	\$1,200+	\$50 to \$275	\$600+

3. Recommendations for identifying potential dark fiber customers

Based on our experience in a range of markets, we suggest exploring dark fiber sales opportunities with a range of potential customers, including:

- a. *ILECs*. Independent or cooperatively-owned telcos must acquire the interconnections they need to trunk traffic back to the PSTN. In some cases, multiple independent telcos have worked together to develop a common interconnection network. Some public owners of fiber in rural areas have worked with telcos to develop these networks
- b. *CLECs*. Much like ILECs, facility-based CLECs must connect their networks to other carrier networks. CLECs frequently lease these interconnection circuits from incumbent carriers, but they will usually entertain alternatives.
- c. *Data transport carriers*. Companies providing data transport frequently need to fill-in or augment their existing networks. Especially in rural and semi-rural areas, private carriers may be interested in leasing capacity to expand or better serve their customers.
- d. *Tower-owners and wireless carriers*. These are markets that almost entirely fund the operations of at least one regional non-profit fiber network with which we've worked, though that network's fiber connects directly to many towers.
- e. *Data center vendors*. Businesses needing off-site data storage or server solutions require high-bandwidth resources. Some data center operators will interconnect physically separated facilities for disaster recovery purposes. Corporate data centers or commercial colocation centers may be interested in using dark fiber to meet their interconnection needs.

4. Recommendations for pricing fiber

The appropriate pricing for dark fiber will be a balance of attracting customers, realizing sufficient revenue to make it worth the effort, and preserving sufficient fiber for the owner's use.

Recommendation for up-front lease fee plus maintenance

With respect to pricing structure, a reliable approach is to adopt the most common model (up-front payments for each strand mile pricing plus annual payments for maintenance per route mile). The benefit of offering 20 year IRUs with up-front costs is that the model is familiar to most customers, desirable to many private sector entities from an accounting and tax standpoint, and will deliver a substantial amount of funds in the challenging early years of operation rather than spreading those revenues out over time. As this revenue can

be used towards meeting grant fund matching commitments, this model could allow Program Income to directly fund a greater percentage of cash match commitments. The model also locks in the deal for a period of time—even as carrier dark fiber prices are likely to adjust to meet your new pricing—thus securing the modest revenue stream that might otherwise be lost to a competitor after a short-term contract.

We recommend a process of exploring the potential price with at least one (though ideally, two) interested customers as a means of establishing a feasible price. We do not recommend beginning the negotiations with a firm price-sheet; rather, you can use the process itself to firm up the price.

One issue to consider during negotiations is that fibers leased on only one or a few segments may make corresponding fibers on the other segments less useful (and in some cases useless). It's for this reason that Level 3 requires its dark fiber customers buy the entire ring—so that it is not left with stranded fiber with no revenues associated. As requests arise for multiple or single segments rather than full rings or substantial runs, one consideration for the negotiator is whether to require leasing of longer segments in return for reduced per mile pricing—a scenario that would net greater aggregate revenues and reduce the risk of stranded fiber.

As to price, we recommend starting with a price on the high side and then negotiating to reduce the price if necessary. A dark fiber customer is avoiding as much as \$100,000 per mile in new fiber construction costs to build its own, or as much as \$1,000 per month per location for leasing high-capacity connections. In addition, leasing dark fiber from other carriers frequently requires not only high monthly fees but also paying the cost of construction.

The prices you're likely to arrive at will probably be well below market and will have the potential to transform the dark fiber market within your footprint.

Recommendation for short-term monthly lease fee

Adding a short term option for leasing at an effective higher monthly fee is also a good idea, both to encourage longer term leases as well as to capture opportunities for short-term users. Setting a far higher cost, compared to recurring fees in a “maintenance-only” model, has the benefit of incenting the buyer to consider the long term option, and also compensates for the risks of a short-term deal.

The monthly option could include some minimum term (one to five years) that enables the owner to recover its transaction costs. The benefit of the monthly deal is that it will generate more recurring revenue (and create disincentive to spend all the money at once). This model is also a benefit to small and local ISPs who will need their limited capital to build out last mile networks—and may not have the ability to fund both the last mile and the transport IRU.

The biggest challenge with this monthly arrangement is how to price the risk associated with the ISP's possible inability to pay in the future. Even if the ISP signs a 20-year deal, the monthly option should probably require net payments substantially higher over the 20-year term than the cost of up-front payment plus maintenance model. There is an added complication in that the owner, in this circumstance, might want to require a lien against the ISP and their most important asset—their last mile network and the customers it services—to secure the long-term revenues under the IRU contract. This adds complexity to the arrangement and may serve to deter customer interest.