

City of Culver City
Dark Fiber Pricing Guidelines
November 4, 2016
Draft Rev 5

This document provides an overview of City of Culver City (City) dark fiber offerings, pricing, and quote process guidelines. The City Manager will leverage the pricing guidelines to approve individual quotations for dark fiber fixed-term licenses and IRUs.

1. Dark Fiber Overview

Dark fiber consists of fiber strands that are unused or “un-lit” and not connected to electronics, which “light” the fiber. Dark fiber is also referred to as fiber that is provided in a “dark” state to be connected and “lit” by the customer.

Dark fiber pricing is typically based on two approaches:

- **Fixed term license pricing.** This structure has the benefit of delivering to the fiber owner a steady annual income stream over time, but it does not deliver large front-loaded payments that could serve to bridge a difficult budget year or to finance new investment. On the other hand, this model is more achievable if the dark fiber licensee is not able to make a large front-loaded 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.

Over the same period of time, net pricing over the term of the license tends to be considerably higher than in the upfront payment model. This model is often used for licenses with a term less than 10 years, and can deliver substantial revenues for a short time. This model is appropriate for private Internet service providers (ISPs) and businesses that prefer agreements for 10 years or less.

- **Up-front payment, plus maintenance.** Dark fiber is often conveyed as a 10 to 20-year (most often 20) Indefeasible Right of Use (IRU). The customer pays up front for the IRU in advance or in the early years of the term of the IRU, and pays on an ongoing, periodic basis for maintenance (typically, on an annual basis). The maintenance fee is calculated on the basis of route miles, not strand miles. The annual maintenance fee has a flat per mile fee for low strand count IRU's and increases slightly for higher strand count IRU's. The early IRU payment covers the entire term of the IRU, while the maintenance provisions of the agreement allow for cost adjustments based on a fixed inflation factor or a Consumer Price Index (CPI).

The benefit of this model is the substantial inflow of funds early in the IRU agreement term. These funds can help bridge any potential early-year cash shortfall while an entity is beginning operations. On the other hand, the model

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will not result in recurring annual revenues over the long-term beyond the payment for maintenance costs. Long-term institutional customers, such as the school district, are good candidates for IRU agreements.

Of the above dark fiber approaches, the fixed term licenses are the most common.

The City plans to offer fixed term full-ring dark fiber licenses on 1, 3, or 5-year terms, fixed term point-to-point (partial ring) dark fiber licenses on 3 or 5-year terms, and 20-year dark fiber IRU's.

2. Culver City Fiber Overview

The City is in the process of installing 20.7 miles of 576-strand dark fiber. The dark fiber is laid out into three loops and ties between the loops.

Loop	Miles
North	4.8
Central	7.8
South	5.0
Ties	3.1
Total	20.7

The probable dark fiber strand allocations are shown in the following table:

Total Strands, less	576
MOX Networks IRU	(12)
City Allocation	(72)
Economic Development Reserve	(48)
Maintenance Spares (City & MOX)	(24)
Net Strands	420
Maintenance Spares (Dark Fiber Licenses)	(108)
Net Strands Available for License	312

3. Policy Guidelines

A. Overview.

Technical and policy considerations influence dark fiber licensing. When managing dark fiber license agreements, the City will implement and adjust policies to ensure that the fiber strands are used efficiently and that considerations for potential future expansion are not compromised. In this regard, the City will balance its interest in creating a competitive, open access environment, in ensuring that the fiber strands are carefully managed allowing for expansion of City use, and in preserving sufficient strand availability for maintenance. In many respects, these

objectives can be in opposition. On one hand, pricing and related policies must result in rates that are high enough to discourage individual customers from licensing unnecessary fiber strands, whether by simply being wasteful or by attempting to control the fiber to block access by competitors. On the other hand, policies and pricing mechanisms must result in rates that recover costs, if possible, while still being low enough to discourage potential customers from installing their own fiber.

It is critical to remember that 576 strands of dark fiber may appear abundant; yet, the licensing of dark fiber quickly uses up strands, and loops can easily end up with isolated strand segments.

In addition, meticulous record keeping is a critical part of managing dark fiber. Maintaining timely and accurate as-built documentation and strand maps are mission critical for maintenance, strand routing, and understanding what strands are currently in use or available for use in the future.

B. Objectives

The City must control access to City handholes and splice enclosures for security purposes. The placement of an adjacent handhole for the licensees will allow them to place and access their splice enclosures and slack loops without compromising City infrastructure. Particularly at junction points of high demand fiber segments, the City may also place a row of smaller handholes that can be used for licensing, and each licensee may place its own handholes as well (as approved by the City).

Effective City policies will encourage use of City-installed drops to connect to the customer premises rather than having a demarcation at a handhole. Such policies will ensure that the licensees bear sole responsibility for the timely activation (“lighting”) of the licensed fibers and associated facilities, and that the licensees will be responsible for paying any utility and other charges that are required for their operation of the fibers.

4. Revenue Goals

Prices must be low enough to:

1. Encourage ISPs to leverage Culver City fiber to deliver new services.
2. Lower market entry barriers for new and alternative ISPs.
3. Facilitate making retail services available from alternative ISPs.
4. Enable the ISPs to obtain sufficient margins to cover their operating expenses and provide a reasonable profit.

5. Allow businesses and organizations to create affordable non-shared networks.

Prices must be high enough to:

1. Generate sufficient revenue to cover ongoing operations, maintenance, and reinvestment expenses.
2. Generate sufficient revenue to recover costs incurred by the City to connect to a customer facility (drop cost) over the term of the dark fiber license. For IRUs, any drop costs funded by the City are collected as part of the one-time IRU up-front payment, where appropriate.
3. Fund strategic expansion of the Culver City fiber footprint.
4. Potentially generate sufficient revenue to cover debt service on the City's original fiber investment.

5. Pricing Guidelines

Each agreement with the City will be individually negotiated and approved by the City Manager.

The pricing is structured to ensure that dark fiber rates are competitive with private and public offerings in the region.

Dark fiber pricing varies greatly among markets and, even among carriers in the same market. Pricing is typically route-specific and location-specific, and at times can seem arbitrary in the marketplace. Commercial pricing frequently is based on a mix of factors including market competition in that location; market demand in that location; and the cost of building in that location. Pricing by non-profit entities 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: (1) long-haul fiber, and (2) metro-area fiber.

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, urban routes will generally be priced significantly higher than routes in suburban and exurban areas, depending on the desirability of the market. Occasionally, an urban market will prove to be surprisingly cost-effective, usually because a glut of fiber in the market has the competitive impact of pushing prices down.

5.1. License Pricing

Fixed-term dark fiber licenses are the most common offering. They allow customers the benefits of having dark fiber access without a large one-time investment. Pricing is typically based on strand/mile/month fee that includes both fiber access and maintenance. At times, an additional per-access site or demarcation fee is applied (handoff between the City and the customer).

For example, the Los Angeles Department of Water and Power (LADWP) offers dark fiber on a month-to-month basis. The LADWP uses a declining scale for the fees based upon the number of miles. The cost is \$100/month/location, plus a per-mile, per-month charge of:

- \$300 per month per fiber strand for 1 to 10 miles
- \$180 per month per fiber strand for miles above 10 to 20 miles
- \$120 per month per fiber strand for above 20 to 30 miles
- For miles beyond 30, the rate is negotiated

The City's license pricing includes a monthly fee (based upon total strand-miles in the license) and a monthly fee for each demarcation point (hub, handhole, or customer premises).

Factors that impact the monthly license fees include:

- Term of the license (1, 3, or 5-year)
- Number of strands in the license,
- Total route miles in the license,
- Total strand miles in the license,
- Number of complete rings included in the license,
- Type and quantity of demarcation points,
- Competitive discount applied by the City, and
- Economic development discount applied by the City.

The City's license pricing is structured to encourage licensees to use a full ring. The license pricing is also structured to offer reasonable fees when partial rings and low strand counts are used. However, the pricing is also structured to encourage licenses of fiber by individual businesses and alternative ISPs.

5.2. IRU Pricing

IRU pricing typically has two key components – (1) a one-time payment (or front-loaded payments in the early years) based on the total strand miles (total route miles times the number of strands) and (2) an annual maintenance charge based upon the total number of route miles (not dependent upon number of strands). The annual maintenance charge is subject to an annual increase based upon a Consumer Price Index (CPI) or a negotiated fixed percentage. These rates can also vary based

on other factors, such as construction costs, length of the term of the agreement, quality of service, competitive discounts, economic development incentives, etc.

In major urban areas, commercial pricing for IRUs can range from a \$2,000 to an over \$50,000 per-mile-per-strand up-front payment for a 20-year term, depending on the provider and on whether complex routing is necessary. Annual maintenance charges range from \$200 to over \$300 per-strand-per-mile.

In the dark fiber market, most IRUs have a requirement that the grantee obtain a minimum of 12 strands. The City may consider IRUs at lower strand counts, but at a substantially higher strand mile payment.

The City's IRU pricing includes a one-time payment and an annual maintenance charge. In addition, a monthly fee is applied for each demarcation point (hub, handhole, or customer premises).

Factors that impact the IRU one-time payment include:

- Number of strands in the IRU,
- Total route miles in the IRU,
- Total strand miles in the IRU,
- Number of complete rings included in the IRU,
- Type and quantity of demarcation points,
- Competitive discount applied by the City, and
- Economic development discount applied by the City.

The City's IRU pricing is structured to encourage IRUs that use a full-ring and a reasonable quantity of fibers.

6. Quote Process

This section provides an overview of the process followed by the City Manager to develop a dark fiber quote.

6.1. Application

If the Customer wishes to obtain a quote for a dark fiber license or IRU, the Customer must furnish a completed form (See draft form in Exhibit A) that contains Customer contact and other information. The Customer must also provide a list of sites (demarcation point) to connect, and the requested number of strands. This will allow the City to create a quote for the Engineering Study described below.

6.2. Engineering Study

An engineering study (Study), to be performed at the direction of the City, must be completed in order to determine the routing of the fiber and associated costs for the

installation. The Customer is responsible for the cost of the Study, which cost must be paid by the Customer up front. The cost of the Study will be quoted by the City based on a variety of factors including total strand miles, total route miles, use of a partial or full ring, length of license, economic development considerations, competitive alternatives, and other attributes. Upon receipt of the Customer Information form attached hereto as Exhibit A and payment for the cost of the Study, the City will coordinate completion of the Study and prepare a report that outlines its findings.

6.3 Customer Acceptance of Proposal

If the City determines, based on the Study, that dark fiber connection is feasible, the City will provide the Customer a report summarizing its findings, which will include a proposal that delineates the associated fees, terms and conditions, and instructions on how to obtain a Fixed Term License or IRU Agreement. If the Customer wishes to proceed with the dark fiber connection, the Customer will be required to furnish to the City two (2) executed copies of the Fixed Term License or IRU Agreement together with any required upfront payment. This will allow the City to initiate providing dark fiber provisioning to the Customer.

Exhibit A
City of Culver City Dark Fiber
Customer Information
(Confidential as Permitted by Law)

The following information is required to proceed with an Engineering Study.

1. Company Name:
2. Address (Billing):
3. Billing contact:
4. Billing contact email:
5. Billing contact phone:
6. Address Local (if different):
7. Local contact (if different):
8. Local contact email:
9. Local contact phone:
10. Do you own or lease the facilities to be connected?
 - a. If leased, what is the length of lease? Months/years remaining?
Include property owner consent.
 - b. If leased, provide details of ownership:
 - i. Organization/name
 - ii. Contact
 - iii. Address
 - iv. Phone
 - v. Email
 - vi. Fax
11. Type of business:
12. Description of the dark fiber requested:
 - a. Number of strands
 - b. Desired facilities to connect
 - c. Entry points
 - d. Demarcation points
 - e. Redundancy/path diversity
 - f. Desired license term (1, 3, or 5-years); or is a 20-year IRU requested