

# Tunnel Systems

## An Underutilized Deployment Pathway Equals An Unrealized Revenue Stream

In the fast-paced world of the 21st century, high-speed broadband connectivity is not just a luxury; it's a necessity for economic growth, education, healthcare, and community development. As urban areas evolve, the demand for robust broadband infrastructure becomes paramount. Unfortunately, most metropolitan zones are characterized by limited space and poor planning. Build-as-you-grow infrastructure and utilities make it difficult to route new cables without disrupting the surrounding community and incurring tremendous cost.

Often overlooked, utilizing tunnel systems to deploy fiber optics, can provide last-mile and intra-city broadband pathways by providing immediate, cost-effective, and durable deployment routes without disrupting the municipality or mother nature.

This fact presents Transit Operators with a unique opportunity to make money by laying "dark fiber" into their existing tunnels leasing excess fiber to local Service Providers and businesses for a monthly fee in the short (less than five years) or long term (five to twenty years). When leasing longer term it is called an Indefeasible Right of Use (IRU) Lease.

### Dark Fiber Leasing and IRU Pricing

"Dark fiber lease and IRU pricing is influenced by several factors, including the uniqueness of the route, **the number of strands or fiber pairs leased**, the depth or end location of the network, the contract term, as well as maintenance and support services.

Dark fiber lease pricing in U.S. metro networks typically involves a (per strand) recurring charge of approximately **\$2,000 per month** for shorter, local routes, and **\$5,000 to more than \$10,000 per month** for longer, suburban routes. This is in addition to a one-time installation charge of approximately \$5,000.\*

\*<https://dgtlinfra.com/dark-fiber-networks/>

**Freeform Ribbon™ Pliable Ribbon Fiber = Smaller Cable ODs:**  
More Cable on the Reel Means Faster, Cost-effective, Safer Deployment

**Place Cable Directly into Snake Tray:**  
No Conduit Needed Saves Time and Money

## Transit Tunnel Sample Bill of Materials

### Outside Plant Cable

(Use independently or in combination as needed)

- Freeform Ribbon™ OSP OSP/ISP Armored & Non-Armored Cables
- FutureFLEX® Air-Blown Fiber® Solutions
- Freeform Ribbon™ OSP All-Dielectric Microduct Cables

### Central Office/Entrance Room

- 3K Vertical Hyperscale eXchange (3K-V-HSX)
- Cable Breakout Kits for Ribbon
- Freeform Ribbon™ Central Tube Cables
- PrecisionFlex® Empty Patch Panels
- PrecisionFlex® FOX Splice Cassettes
- PrecisionFlex® Pre-Terminated Patch Panel
- Rack-Mounted Splice Enclosure
- Cable Assemblies

### Platform

- NEMA 4X/IP66 Splice Transit Enclosure
- Pre-Terminated LC/APC; SC/APC Transit Enclosures

### Tunnels/Underground Cables &

### Assemblies

(Use independently or in combination as needed)

- Freeform Ribbon™ Transit ISP/OSP LSZH-NFPA130 OFCR Steel Armored Cable
- Cable Assemblies: O/I LSHF Armored & Non-Armored
- FutureFLEX® Air-Blown Fiber® Solutions
- Freeform Ribbon™ OSP All-Dielectric Microduct Cables

### Main Distribution Frame (MDF)/Independent Distribution Frame (IDF)

- Rack-Mounted Splice Enclosure
- Cable Breakout Kits for Ribbon
- Freeform Ribbon™ Central Tube Cables
- PrecisionFlex® Empty Patch Panels
- PrecisionFlex® FOX Splice Cassettes
- PrecisionFlex® Pre-Terminated Patch Panel
- Cable Assemblies



# TRANSIT TUNNEL OPTICAL NETWORKING SOLUTIONS GUIDE

Designed with your Needs in Mind



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NEXT GENERATION THINKING™

# Tunnels for High-Speed Broadband Deployment

Sumitomo Electric Lightwave (SEL) has developed a comprehensive and standards compliant (NFPA130 and NFPA502) end-to-end connectivity solution designed specifically for Transit Tunnel Environments that meets current transit passenger Wi-Fi and connectivity needs as well as offer operators a path to revenue generation via the leasing of fiber to underserved areas along the existing transit footprint.

Backed by a dedicated transit team and track-safety-trained field engineers, SEL is a committed partner throughout the entire process.

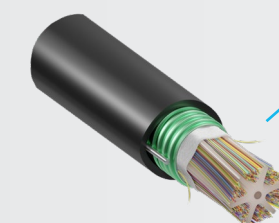
## 3K Vertical Hyperscale eXchange (3K-V-HSX)

- Fiber Capacity of 3456-F (8 x 432-F Trays)
- Wall-mountable
- Compact size



## Cable Breakout Kits for Ribbons

- Easy to Install & Use
- Intuitive Tubes & Color Coding
- Tubing length of 1 ms



## Freeform Ribbon™ Armored Conventional OSP Slotted Core Cables

- Fiber Count: 144-F to 1728-F
- High Fiber Density Maximizes Duct Space
- 12-F, splice-ready ribbon groupings



## Cable Assemblies

- Available in LC/SC/ST and UPC/APC
- Variations include I/O, Indoor, Armored, micro armored, Riser, Plenum, LSZH, and No Jacket
- Available in Simplex, Duplex, Interconnect, and Trunk Configurations

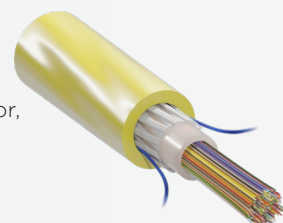


## PrecisionFlex® Pre-Term 2RU Patch Panel

- Rack-Mountable
- 144 Duplex LC/APC in a 1RU Configuration
- 288ct Duplex LC/APC in 2RU Configuration
- Built-in Cable Slack & Routing for Easy Access
- Shuttered Adapters to Prevent Contamination

## Freeform Ribbon™ Central Tube Cables

- Up to 1728-F
- Available as OSP, I/O, Indoor, Riser, LSHF Riser, Armored
- 12-f, splice-ready ribbon groupings



## Cable Assemblies

- Available in LC/SC/ST and UPC/APC
- Variations include I/O, Indoor, Armored, micro armored, Riser, Plenum, LSZH, and No Jacket
- Available in Simplex, Duplex, Interconnect, and Trunk Configurations



## Splice Transit Enclosure

- Meets IP66 (NEMA4X equivalent)
- Fiber Capacity: 1728-F
- Mass Fusion Splices
- Wall or Ceiling Mountable
- Built-in Cable Slack, Wiring Guides, & Routing for Easy Access
- Enclosure Body is made with aluminum



## Rack-Mounted Splice Enclosure

- Built-in Cable Slack & Routing for Easy Access
- Fiber Capacity: 1,728 Mass Fusion Splices (4 trays x 432-F/tray)
- Sliding Splice Trays

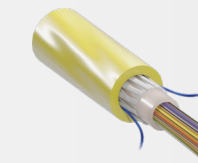


## Cable Breakout Kits for Ribbons

- Easy to Install & Use
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## Freeform Ribbon™ Central Tube Cables

- Up to 1728-F
- Available as OSP, I/O, Indoor, Riser, LSHF Riser, Armored
- 12-f, splice-ready ribbon groupings



## Cable Assemblies

- Available in LC/SC/ST and UPC/APC
- Variations include I/O, Indoor, Armored, micro armored, Riser, Plenum, LSZH, and No Jacket
- Available in Simplex, Duplex, Interconnect, and Trunk Configurations



## Empty PrecisionFlex® Patch Panels

- 1RU, 2RU, 3RU, 4RU
- Rack-Mountable
- Built-in Cable Slack & Routing for Easy Access



## PrecisionFlex® FOX Splice Cassettes

- LGX footprint splice cassette available with: 24 LC duplex ports, 12 LC/SC/ST ports, UPC/APC
- Removable mounting flanges/ears (for front or back installation)
- Factory assembled and tested

## Pre-Terminated LC/APC Transit Enclosures

- Meets IP66 (NEMA4X equivalent)
- Available as LC/APC (other connector/polish types available upon request)
- Fiber Capacity: 144 LC
- Wall or Ceiling Mountable
- Enclosure Body is made with aluminum



## Freeform Ribbon™ Transit ISP/OSP LSZH-NFPA130 OFCR Steel Armored Cable

- 48-F to 1728-F Freeform Ribbon™ Cables
- 12-F, Splice-ready Ribbon Groupings
- Meets NFPA130 and NFPA502
- Snake Tray Rated



## Why Use Freeform Pliable Ribbon Cables? Save Time, Money, and Space

Using Freeform pliable ribbon cables in your network saves you time and money thanks to smaller cable OD and weight compared to equivalent non-ribbon fiber cables -particularly single-fiber loose-tube cables, making them easier and faster to install and an efficient use of space in already crowded areas.

- Up-to 6912-F into 1.5" ducts
- Increased fiber count for cable OD. Up to 5x compared to LT cables
- Increased reel cable length by up to 50%
- Efficiency - Splice 12 fibers at once
- Less Waste - Fewer splices also means fewer consumables.