

# Knet Blulight Microduct Total Solution 2020/2021



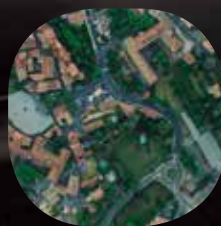
Solutions



Applications



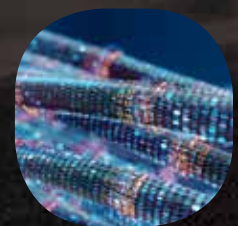
Microduct



Specialty Duct



Connectivity



ABF/ABC



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# About Knet

Since its establishment in 2002, KNET has been contributing to the development of Telecommunication technologies by Supplying excellent products and providing Microduct total solutions to customers all over the world.

Our best expertise and professional R&D teams have always focused on high quality and longevity of every single product we supply with respect to our nature.

KNET has played a vital role in the development of broadband network. We have been cooperating with various telecom operators and telecom infrastructure providers, and participating in numerous projects in Europe, America, Africa, Asia and Oceania.

As a total solution provider, KNET implements the project from network design to Installation phase, providing all the necessary technical training, service and maintenance with its own resources.

Almost 20 years later, our devotion to find the very best solutions we can provide to the customer is shown through our participation in projects worldwide.

KNET is never afraid to challenge conventional method, so our expert of teams will be very happy to meet the demands of global customers and help for most efficient and low-cost infrastructure system.

## History

- 2002 Company established
- 2003 Development of microduct system for FTTH
- 2004 Factory in Jeong-eup established
- 2005 Quality System ISO 9001 certified
- 2006 Quality Management System TL9000 certified
- 2007 Chosen as small and medium-sized company with technology innovation (INNO-BIZ) Launch of microduct for FTTH in European market
- 2008 ISO 14001:2004/KS A 14001:2004 certified
- 2009 Korea National Excellent Product (Microduct)
- 2010 10 million USD export award
- 2011 USA & Indonesia Branch office open
- 2012 Malaysia Branch office open
- 2013 Telcordia compliant with GR 3155/Verizon TRP9442, UL Rate
- 2014 Participated in the development of GR-3155-Core, Issue2
- 2014 Myanmar Branch Office Open, Supplied Microduct and consulted Technology/installation for Mobile tower connection in Myanmar
- 2017 Developed and applied Enhanced Silicone Liner to improve the blowing performance. Released new developed product Micro Drop Duct for Major service provider in Korea
- 2019 Provided Microduct duct for Energy pipe line infrastructure using digital technology in the USA. Chosen as main supplier for Dark Fiber, FTTH & National Broadband project in Philippines
- 2019 Added new 20 more countries to export microduct on year of 2019 to expand more than 70 countries in Knet's supply chain profile

# Knet Provides Solutions for Next Our Business

## PE Pipe Systems – Manufacturer

Knet has produced HDPE pipe for civil engineering and communication since 1998 in Korea. Knet participated in many huge projects by the government and has experienced of working for project internationally.



## Total Solution Provider

Our extensive knowledge has enabled us to create a name for ourselves as a leading system provider for PE piping solutions



## PE Pipe Systems

Engineering Service (Provides Fitting and Joint Technology, Blueprint support)  
Training Service ( Fitting Installation)  
Maintenance and Repair Service

## Communication- Global Microduct Solution Provider

Knet expanded its overseas business with the launch of the microduct communication tube business in 2003. Currently, we are exporting to more than 70 countries.

In addition to product export, we also provide network consulting, engineering, etc.

By providing solutions, it is widely known not only as a manufacturer's image to overseas customers, but also as a solution provider.

We are contributing to the completion of the project by proposing products, applications, and designs suitable for the project by closely linking with customers from before the project completion stage.



Europe FTTH in Netherland



ISE in USA



Vietwater in Vietnam

# Technology Service

## Microduct Network Design & Engineering

The optical network construction based on microduct system is a proved, flexible and cost effective solution, but some of the design concept is relatively new compared to the conventional cabling. With our accumulated knowledge from manufacturing, design and installation for more than 15 years, KNET provides consulting services including network design by experienced engineers.



## Network Deployment & Installation

The civil works for deploying microduct and fiber cable generally require elaborated job scheduling and experience in order to guarantee a long-term stable operation and to avoid unexpected cost expenses. For several years, KNET has successfully carried out microduct projects ranging from in-building, FTTH, intra-city to long distance in many countries like Korea, Indonesia and Myanmar etc. With this knowledge of skilled engineers and quality products of BluLight, KNET provides microduct total solution to our customers.



## Operation & Maintenance

Fiber cable transmit high speed data through long, branched network, so any service disruption causes serious problem for both service provider and customers. The fiber monitoring system (FMS) that measures fiber integrity by switched OTDR, which enables real time alert and provides fault location when a cable damage happens. KNET supplies the FMS for enhancement of optical network reliability.



## Specialized Training

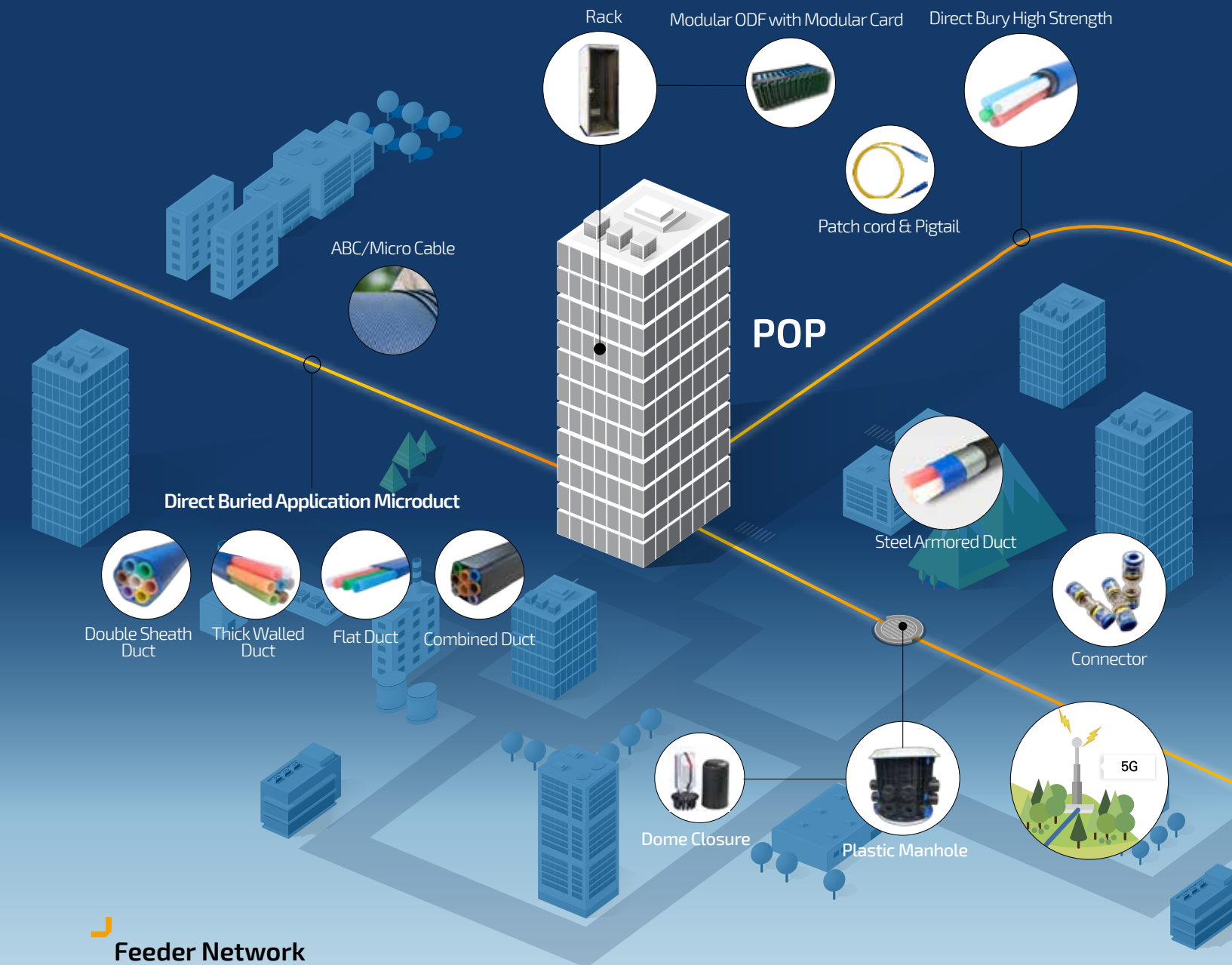
KNET experts are trained in the air blown system and various trenching techniques. We have, the facility available to other customers and partners who require training on microduct and air blown solution. We have the ability to support network design, deliver knowledge about this advanced technology, providing Fiber Network Management System as well as presenting consulting services. We have, also provide a fully integrated demonstration of microduct total solution where our clients can learn directly.



# Solutions



The technology is more and more connected as the world is.  
Our solution from Greenfield  
to Last Mile will help the telecommunication network connected.



## Feeder Network

The PoP (Point of Presence) is the heart of a network, the place where connections come together. Its setup needs to be able to cope with different demands in capacity and support, speed and quality, and automatic configuration. Having said that, from PoP to FDH, Microduct solution with various configuration and application, especially future proved solution will be efficiently used. Different type of Direct Buried microduct will be the options to be chosen. In case that you have to do HDD, then double sheath multi duct will be the one of the best choice. For Micro /Mini trenching, either thick walled duct or Flat duct can be used. Even High capacity of fiber such as 144 or 288 core for feeder, you don't need large size of Conduit like 100mm PVC duct, 14/10mm 7way will be used for feeder. Some part of the area such as brownfield with old infrastructure, the issue with live rodent will be solved with Knet's Steel Armored duct. Combined Duct for example 14/10mm, 10/8mm combined size is used for saving Civil cost for service provider to chose different duct depends on their demand rather than building feeder network separately.

### Microduct

- Thick Walled Duct
- Flat duct
- Double sheath duct
- Steel Armored Duct
- Direct Buried High Strength
- Combined Duct

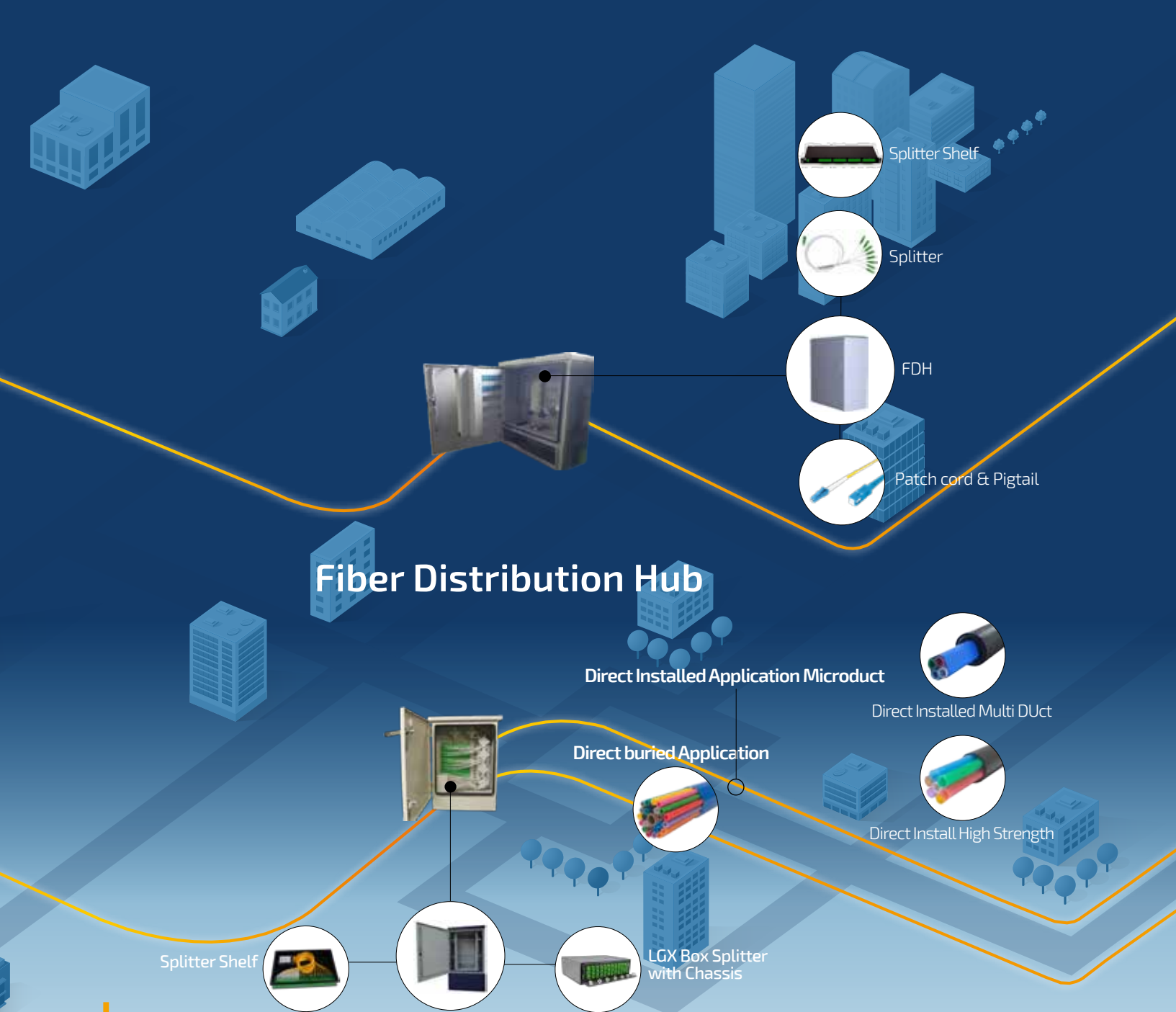
### Connectivity Product

- Rack / Modular ODF with Modular Card
- Patch Code & Pigtail
- Plastic Manhole
- Dome Closure

### 5G / FTTA

Knet will support your fiber to the antenna or wireless project with Fiber cables & Power cable, breakout boxes, and microducts designed to lower your pole attachment profile. Combined with our wide variety of microduct types we support any desired construction method to get you to the connection point including microtrenching, direct install, direct buried, or aerial





## Fiber Distribution Hub

### Fiber Distribution

High capacity of fiber from Feeder will be splicing in FDH to distribute using Microduct such as up to 24 way.

Direct Buried Microduct for new built pathway and Direct Installed Microduct will be used for pre existing conduit.

Newly trenched underground will have 24way microduct to branch 1 way to each subscriber to terminate on FDH ( with Splitter, Splicing Tray) without splicing on manhole. The service provider is able to manage all customers on a FDH efficiently, save the cost from removing splicing and reduce optical attenuation.

For pre-existing conduit, you will be able to install 6,048F ( 288Core X3 set of 12/10mm 7way) capacity on microduct on 100 mm Outer duct ( conduit) without additional trenching to save Civil work cost and blowing the cable easily.

Especially, Pre terminated FDH can be used to save the time and labor for distributing the cable and this FDH is customized with microduct management. Optical passive splitter to the distribution network installed.

#### Microduct-

#### Direct Buried Application / Direct Install Application

#### Connectivity Product

- FDH/ FDH(Pre-terminated)
- Splitter Shelf
- ODF
- Patch Cord



## Last Mile

For FTTH, the optimal last mile solution must be used.

Microduct last mile solution has " shorter installation time, lower construction cost and simpler management than Conventional solution. Some fibers in a tube are cut and spliced so delicate and elaborate skill is required but microduct is easy to branch To provide direct fiber path and increase reliability and reduces construction cost. Knet's last mile solution, SDU, MDU and Aerial application has various configuration microduct.

### SDU

All subscribers' management can be done in FDH by installing splitter and connecting fiber(generally 2 Core) to each subscriber. You can install Ruggedized duct, Thick DB, or DB HS 1way to protect fiber, which connects the distribution point and each subscriber.

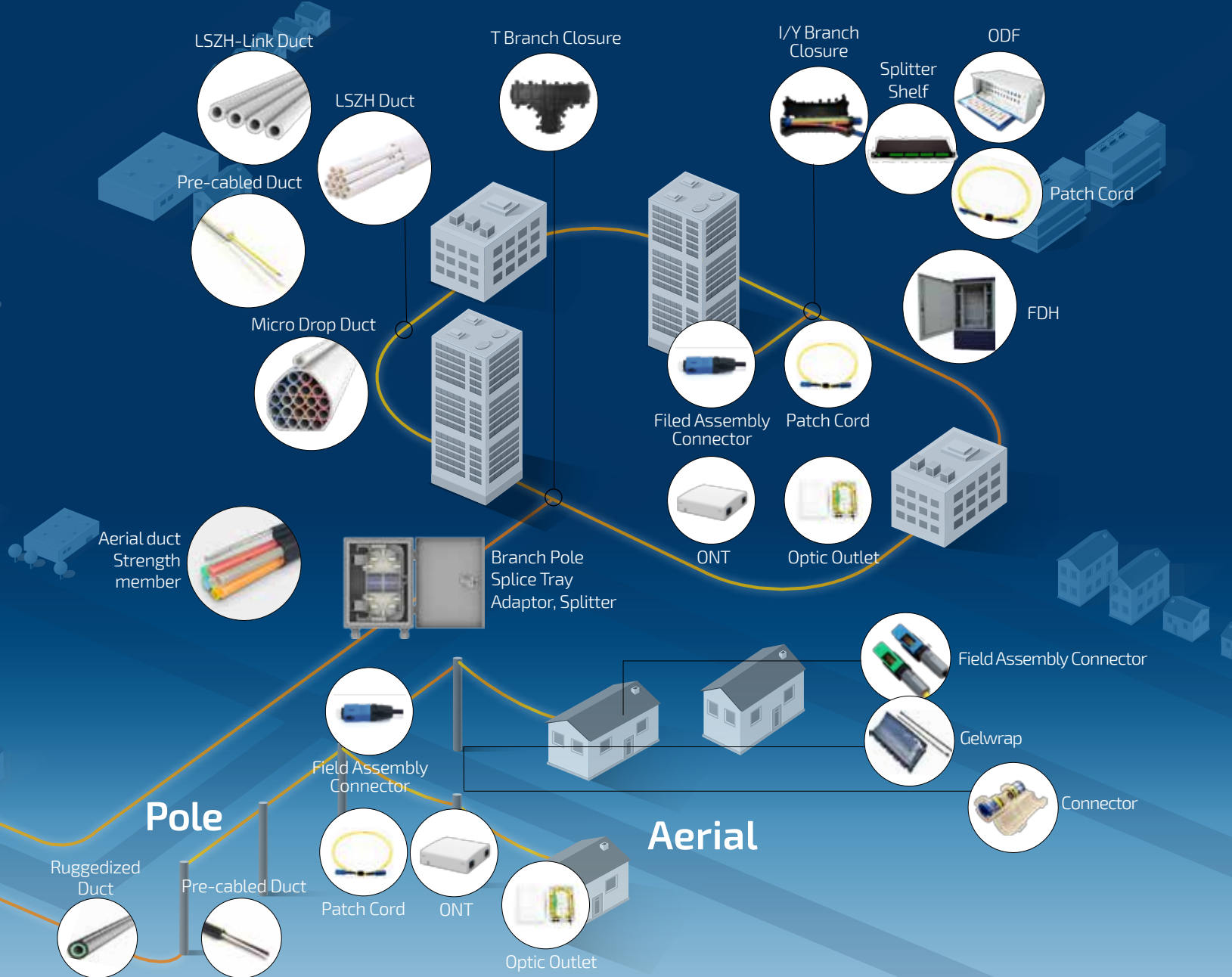
### Microduct for last mile

- Direct Buried High Strength
- Double Sheathed Duct
- Ruggedized Duct
- Pre Cabled Duct

### Connectivity Product

- ONT
- Optic Outlet
- Field Assembly Connector
- Patch Cord

# MDU/High Rise Indoor Buildings



**MDU and high-rise buildings** often offer the highest subscriber density and can be very rewarding projects but offer unique challenges as well. It is often very difficult or impossible to re-access infrastructure after the building is complete. With microduct preinstalled to each unit fiber drops can be blown in by a single installer as customers take service, saving the majority of material cost such as fiber drops until a customer takes service. For low and high rise, LSZH fire retardant material used duct should be used inside of building. Especially link type of microduct can be easily branched out. For old building without pathway inside, Micro drop duct can be installed on outside of building for aesthetic reason and also easy to Distribute to each floor.

## Microduct

- LSZH Duct •LSZH Link •Hybrid LSZH •Micro Drop Duct •Pre Cable Duct

## Connectivity Product

- ONT •Optic Outlet •Field Assembly Connector •Patch Cord

## Aerial

Microduct may be installed above ground along aerial pole lines when underground installation is difficult due to rocky soil or where freezing makes the ground impossible to dig during lengthy periods of time. Knet aerial microducts are self supporting with either a dielectric fiberglass strength member or steel strength member preinstalled. Fibers are installed and protected through microtube path. So, chance of fiber splice is minimized as well diminishes possible damages caused by rodents. Microduct and cable blowing are combined allowing to have future growth at considerable lesser cost.

## Microduct

- Aerial Metallic Strength Member •Drop Duct /Ruggedized Duct •Pre Install Aerial Drop Duct •Dielectric Strength Member

## Connectivity Product

- ONT •Optic Outlet •Field Assembly Connector •Patch cord

## Greenfield



### Planning or designing new fiber networks?

- Direct buried
- Direct Install
- Aerial
- Pre-cabled and special duct

Greenfield projects present many opportunities and offer the best chance to plan for the future. In the past it was difficult to foresee that bandwidth demands would skyrocket as they have, but today it is no secret that bandwidth demands will continue to increase. In a greenfield installation, it is extremely easy to future-proof your network with built in pathways for simple fiber installation down the road, without the cost of installing spare unused fibers today.

## Brownfield



### If you have an under-utilized conduit?

- Direct Install
- Direct buried
- Aerial
- Pre-cabled and Micro Drop duct

Brownfield projects can offer challenges when it comes to fitting in today's technology with yesterday's infrastructure. Luckily, Knet has a variety of options. Microduct is flexible enough to connect to existing microducts of the same size or ducts of slightly larger sizes with couplers. Microduct can also be installed inside of bigger conduits, pipes, sewer lines, and more. And of course it can be installed alongside other infrastructure as well. With its low profile, it is easy to install without disturbing existing infrastructure.

## FTTA/Wireless



### Need fiber network for wireless, especially 5G?

- 5G wireless Breakout box
- Special duct
- Pre-cabled
- Direct Install
- Direct Buried

The need for stronger and more robust wireless infrastructure is greater than ever with the rising popularity of 5G and wireless home internet. When planning a fiber connection to an antenna, it will often be necessary to share a pole location with other providers, and typically space on the pole must be leased. An FTTA project's main goal should be reducing the overall size, weight, and number of connections while maintaining the requisite bandwidth and providing adequate power to the antenna or small cell.

## Smart City



### The Smarty city concept is becoming more popular, need solution?

- 5G wireless
- Special duct
- Pre-cabled
- Direct Install
- Direct Buried

The Smart city concept is becoming more popular, using an IoT network to optimize the efficiency of city operations and services and connect to citizens. Smart city technology allows city officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving while enhancing quality, performance and interactivity of urban services. A Smart city is more prepared to respond to challenges than a traditional city.

## FTTx



### Need quicker connection for new subscribers ? FTTx solution has the answer

- Pre-cabled
- Direct Install
- Direct Buried
- Aerial Duct
- Special duct

FTTx connections for homes and businesses are quickly becoming a requirement for new subscribers. For the first time in history, end users are beginning to demand not only quality service, but a specific technology and specific speed requirements. Users are becoming more savvy to different technologies and demand fiber. In fact, high speed fiber connections have been cited as the number one desired amenity for tenants and property owners. Knet has a solution for you to make it easy and to lower your cost per subscriber.

## MDU/High Rise



### Requiring Fiber regulation for high density of subscribers indoor?

- Lower Smoke Zero Halogen
- Pre-cabled
- Direct Install
- Special duct

MDU and high-rise buildings often offer the highest subscriber density and can be very rewarding projects but offer unique challenges as well. It is often very difficult or impossible to re-access infrastructure after the building is complete. With other service providers competing for subscribers in the same space, this often means additional material expense for non-subscribers. With microduct preinstalled to each unit fiber drops can be blown in by a single installer as customers take service, saving the majority of material cost until a customer takes service. Pre-connected fibers are available to reduce fiber splicing, further reducing installation cost.

## Last Mile



### Need solution for Last Mile?

- Special duct for last mile
- Direct Buried
- Direct Install
- Aerial
- Pre cabled

For an FTTx project, smart city grid, or wireless small cell deployments, the last mile of a fiber installation can be extremely complex with careful planning required. The biggest challenge can be staying within an acceptable loss budget while branching fibers along often pre-determined routes that the operator has no control over such as existing pipe or conduit, streets or sidewalks, or telephone poles. This requires limiting splice points and cross connects wherever possible.

## Long Haul



### Require the solution for future proved solution?

- Direct Buried
- Direct Install
- Aerial
- Pre cabled

Many operators believe that their long-haul fiber network will never need to be upgraded. This has been proven to be untrue time and time again due to population booms and increasing downstream demand. Traditional future proofing requires a large investment in spare fiber that may not be used for a long time.

# Applications - Markets

- Data Center
- Medical Industry
- Government
- Education
- Utility
- Transportation
- Mining
- Airport

**KNET Blulight Microduct provides a versatile and scalable network. This pathway is ideal for telecommunication providers, FTTH solutions, Hospitals, Utility and energy providers, transportation, entertainment, government facilities, corporate complexes, University campuses, military site applications and anywhere high-speed communications are needed.**



## Data Center- Central Office

Data Center can be big like a giant warehouse-sized with hundreds of thousands of servers, switches, and storage and up to a million interconnections or small like what we used to call the computer room.

So speed is a primary concern for data center, so is reliability.

Data centers usually install ultra-high fiber count ( like 6912 C), but space is minimal. Micro cable and microduct is efficiently used on small space.

Our customer used a microduct solution to develop a business park complex with the backbone, distribution network from Data Center to each building ( office, manufacturing facility, showroom, retail store ) in a vast business park. They used LSZH microduct for their Data Center to build a pathway, and they quickly expand their capacity to blow ABF into the duct.



## Medical Industry- Hospital

Health Care service organizations need IT infrastructure that covers voice, video, and data and upgrades to support imaging and archiving communication systems.

Paper-forms now are converting to electronic formats, and building automation applications drive more secure, robust, and easy-to-all install fiber backbones.

The Hospital complex needs to be connected with multiple buildings. Since the technology change in the health care industry is drastically happening, easy to expand fiber capacity is critical. Microduct solution with future proof is always standing by to be replaced with a higher core of fiber optic cable.



## Government

The government's fiber network is being actively built as an infrastructure to introduce e-government, public safety, and public wifi to close the information gap. The government's role becomes more critical than before, and its project has always required a competitive budget and higher scrutiny compare to the private sector.

A more fiber network is necessary to achieve the government's role. As South Korea becomes a global leader of broadband, its government has driven many projects, smart cities, security systems in the town, and e-government. Knet's participation in developing a fiber network for the public transportation monitoring system makes it possible to provide real-time information to citizens. Yr.2020, the Korean government was adapting Micro trenching method for the project to migrate overhead cable to underground to save civil work on trenching to help its budget reduced.



## Education- Campus

Building a smart campus is becoming essential to make students learn anytime, anywhere, and exchange information using electronic devices such as smartphones and laptops.

A campus contains many buildings with a different type of function, classroom, laboratory, administration, library, etc. So it is essential to have a fiber backbone to have these facilities do their role. Multiple fiber types may be needed and their own campus local network should be built.

MDU microduct solution can be used for most of the buildings with multiple floors. Multiple ducts (such as 24way, 12way) can easily branch out to each room and get a higher capacity of fiber. It is often very difficult or impossible to re-access infrastructure after the building is complete. With microduct preinstalled to each unit, fiber drops can be blown or replaced for a newly developed or higher fiber optic cable capacity as technology grows on campus.



## Transportation – Tunnel

The construction of tunnels is increasing in the construction of roads and railroads connecting regions and regions.

The safety of the tunnel is essential because of its spatial characteristics.

Accordingly, numerous sensors and control systems are required for ventilation, lighting, monitoring, and disaster management.

LSZH microduct was installed in Baehuryung Tunnel, the longest tunnel in Korea, to connect two cities in Gangwon Province. This project was a good example of common ducting ( sharing the tube of microduct). Korea's top service providers, KT, SKT and LGU + were investing to build fiber networks inside the tunnel to use the same pathway without installing their own pathway separately.



## Transportation – Rail

It is important to secure a safe communication network for railroad operation. As railways become faster and more intelligent, it is necessary to establish a safe and fast network.

The construction of fiber optic networks is essential for the modernization of railway communication networks. It is also easy to build a backbone network as it can reduce the cost of civil works, etc. when installing optical cables through the railway route. Knet's microduct solution can be installed over a long distance by an air blown solution. Its installation space is small, so it can be easily installed using existing pipelines and facilities.

The Hungarian railway company MAV adopted the GSM-R system to modernize the existing railway network and adopted Knet's microduct solution to build an optical cable network to connect GSM-R base stations.

\*GSM-R, Global System for Mobile Communications – Railway or GSM-Railway is an international wireless communications standard for railway communication and applications.



## Airport

The airport needs fiber optic communication backbone for Air Traffic Control Tower, passenger information services, telephony, public address, building automation, LAN and CCTV that fully transmits all of the information between the gates, terminals, and the operations control room.

Signal integrity is critical. Security concerns plans for the new fiber-cabling plant include a surface-movement guidance-control system. Completely re-cabling an airport is no easy task. If there is already existing pipe, higher core of fiber optic cable installed easily using microduct solution





## Utility – Power

Today's power grids are becoming more and more intelligent. Eventually, it develops into a power artificial intelligence service using AICBM (AI, IoT, Cloud, Bigdata, Mobile) solutions.

Korea Electric Power Corporation (KEPCO) aims to provide uninterrupted electric service by constructing a DAS using electric power and ICT convergence technology.

By quickly locating the location of a power outage and closing the faulty section, and transmitting through the bypass distribution line, the power outage time can be minimized and the loss through distribution system load management.

Also, it provided the highest level of electricity service by enabling safe network operation by linking the distribution system of various distributed power sources. When configuring the optical communication network for DAS construction, Knet's microduct solution is adopted and used.

Civil work needs various application so Power company was starting to build a communication/monitoring network at the same time.



## Utility – Energy

Preventing accidents in advance and keeping facilities safe is the most important factor in utility management. DTS (Distributed Temperature Sensing) and DAS (Distributed Acoustic Sensing) technologies using optical fibers widely used for real-time monitoring of facilities, and real-time monitoring technology for facilities using IoT is also continuously developing.

Knet's microduct solution can easily apply DTS and DAS technology and build an optical network, which is IoT network infrastructure. Managing the pipeline infrastructure's stability requires adopting digital technologies such as smart sensors and cloudy systems, making real-time data collected from the oil field. Drilling optimization, detecting leakage faster, and reducing repair response times can now use telecommunication infrastructure.

Using microduct, it is possible for energy company to deploy fiber optic cables quickly along with their own energy (gas or oil) pipeline.



## Mining

The fibers, which will serve the automation, telephone and internet systems of the new mine, are being installed by means of micro ducts. A rigid cable formed by small grouped ducts, through which the optical microfibers pass. The network can be both aerial and underground. Building or Upgrade communication, monitoring and automation infrastructure in mining needs safety, speed, low maintenance cost and ease of expansion. These requirements are also the benefits of using Microduct solution.

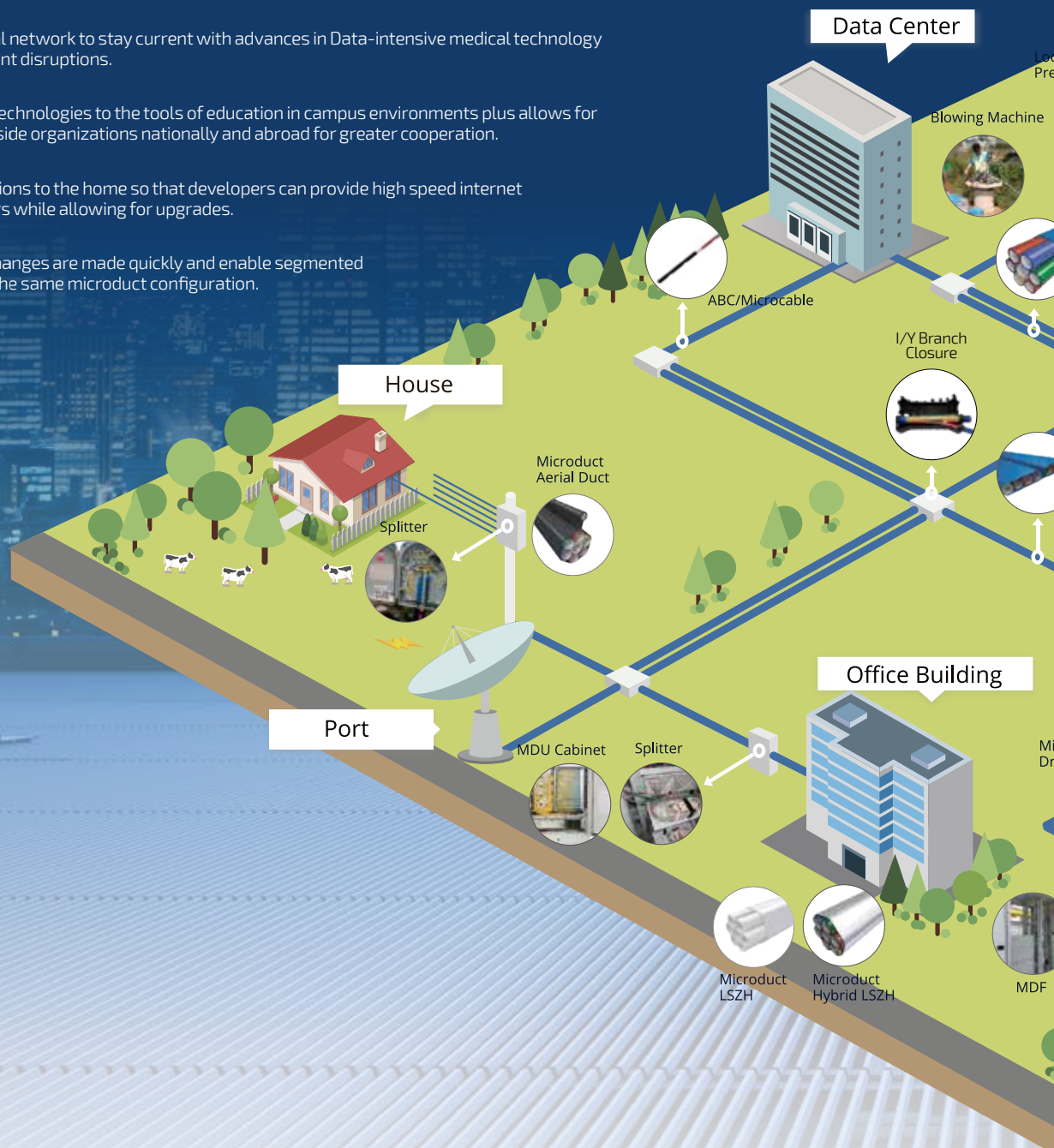
Here is the product configuration for each application. Underground tunnel - LSZH microduct, On rail moving the raw materials from underground to the seaport - Aerial microduct, Data Center – LSZH and Direct Install Microduct

# KNET Blulight™ Microduct

## Who are our customers?

KNET Blulight Microduct provides a versatile and scalable network. This pathway is ideal for telecommunication providers, FTTH solutions, Hospitals, Utility and energy providers, transportation, entertainment, government facilities, corporate complexes, University campuses, military site applications and anywhere high speed communications are needed.

- **Utility Companies**  
System monitoring and controlling, and network data communication.
- **Broadband Network**  
FTTH (Fiber To The Home) and FTTx (Fiber To The X = multiple destinations) providers using optical fiber to provide high speed service to end subscribers.
- **Hospital**  
Secure the entire hospital network to stay current with advances in Data-intensive medical technology and limits staff and patient disruptions.
- **Campus**  
Adapts communication technologies to the tools of education in campus environments plus allows for interaction between outside organizations nationally and abroad for greater cooperation.
- **Developers**  
Helps with fiber installations to the home so that developers can provide high speed internet service to their customers while allowing for upgrades.
- **Government**  
Fiber moves, adds and changes are made quickly and enable segmented and secure networks in the same microduct configuration.





# Benefit of Microduct

KNET Microduct infrastructure provides high flexibility and accessibility allowing additional access network to be newly developed and restructured. From Feeder to lastmile all kinds of projects can be implemented more effectively and economically than expectation.

## 1) Minimizing the Costs

- Initial cost
  - Need less manpower
  - Reduce splicing point
- Future-proof cost
  - Reduce cost for additional civil work



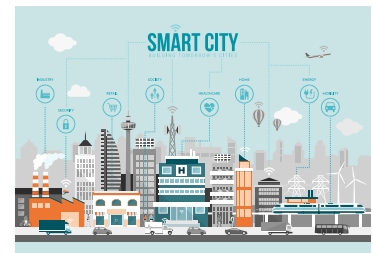
## 2) Environment

- Applied with micro trenching
  - Reduce the dust and waste occurred in construction
- Chemical safety, eco-friendly PE material
  - Assure more than 50 years without corrosion, chemical change of acid, alkali, salt



## 3) Trend

- Increasing demand of fiber and need for additional installation
  - Smart City, FTTx, 5G, IoT, FWA, A.I, Cloud, National Security, International Network



## 4) Technology

- Air Blowing Solution
  - Install cable safely and quickly
- Various installation methods
  - Open, Mini, Micro, HDD, Direct Install

## Advantages of Microduct Technology over Traditional Cabling Outlays

- Microduct products are easily and quickly installed in direct buried application using minimally invasive micro-trenching equipment.
- Microduct offer superior mechanical and environmental protection for lightweight microfiber optical cables, which can be easily installed using various air blowing techniques, or traditional cable pulling and/or pushing method.
- Microduct pathway systems offer telecom carriers increased flexibility due to the ease at which service laterals and drops can be reconfigured and installed as customer demand increases.
- KNET small diameter microduct products are offered in a wide variety of configurations. This gives carriers the option to install microduct pathways into existing occupied conduits. Microducts helps to future proof carrier networks as additional fiber cables can be placed at a later time as the demand for additional capacity increases. Furthermore, whether for additional capacity or for general replacement, fiber optic cables are easily removed and replaced with high density, higher fiber count cables.
- KNET's Indoor microduct products provide safe, flexible, lightweight, durable and easy to install pathways to deploy bare fiber and microfiber cables inside a multi-dwelling unit (MDU) and commercial building.

# Installation Method

## Open Cut Trench Excavation

Open cut trench excavation is the most popular method for installing conventional ducts, microducts. Many types of equipment can be used depending on the conditions of site, methods of construction. This method is generally the least expensive if the site to be excavated is non-pavement area which can be backfilled with soft soil and original soil which doesn't damage the ducts.



## Micro/mini Trenching

Micro/Mini trenching is a relatively new installation method which can reduce the time and lessen impacts on the environment. And if this trenching method is used with Vacuum equipment that sucks the all dust, the impact on environment can be reduced effectively. Conventional trenching method can be time-consuming, labor intensive, and disrupting traffic and passengers due to need spaces for construction and restoration.



Cut by Micro trencher  
Indonesia Bandung Municipal project

## Horizontal Directional Drilling

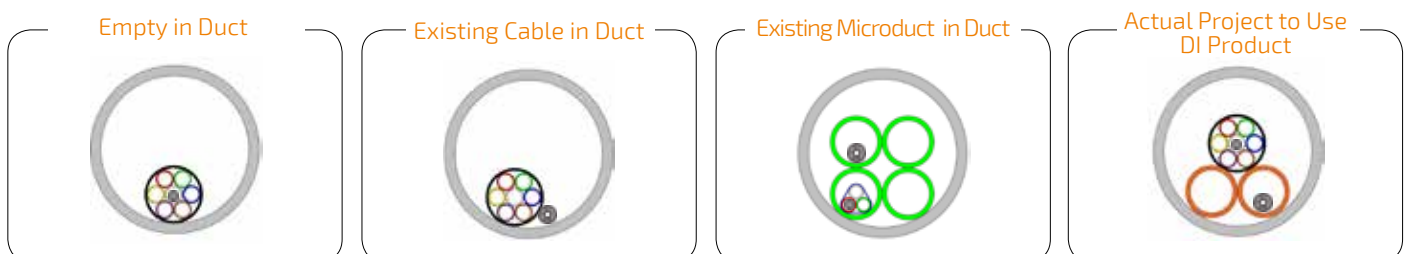
Horizontal Directional Drilling is a trenchless method designed to install ducts from one point to another without breaking all route of trench.

A pilot bore is drilled and guided underground along a pre-determined bore path, then the Microduct is dragged through the bore during back reaming. By boring underground, horizontal directionally drills are able to avoid existing utilities, landscaping, driveways, sidewalks, and other obstructions by equipment detecting the exact location of microduct.




## Direct Install

Microducts are ideally suited for use in occupied conduit systems where additional Microducts are needed and space is limited.



# Microduct Product Line



## Direct Buried Application

TWD  
Flat duct  
Link Duct  
DB HS  
DBAL

## Direct Installed Application

DI HS  
DIAL

## Indoor Application

LSZH  
Hybrid LSZH

## Aerial Duct

## Special Duct

## Specialty Duct

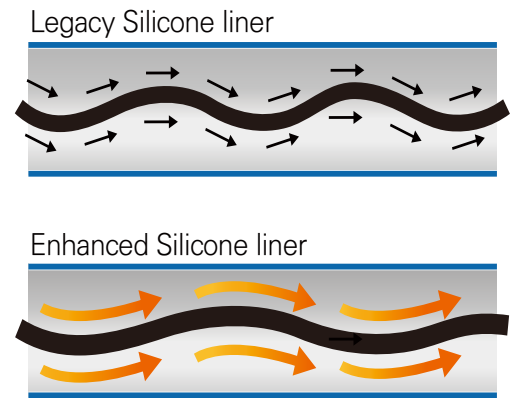
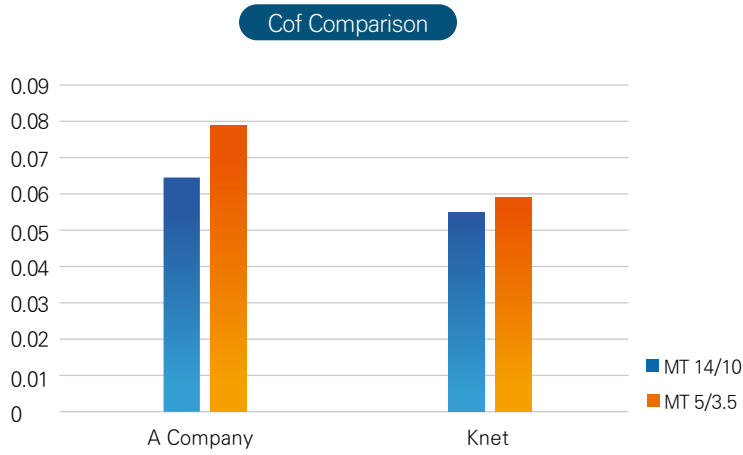
Combined Duct  
Loose Bundled Duct  
Double Sheath Multi Duct  
Steel Armored Duct

The products are designed to enable carriers to bring fiber optic service to business and residential customers with greater speed and efficiency while dramatically reducing carrier deployment costs and disruption to existing roadways and landscaping

# Enhanced Silicone Liner

Air Blown Installations are done by an air blowing technique that reduces the risk of damage to the fiber cable, accelerates installation time and increases the installation distance. Permanent solid lubricant is coated inside the tube of microduct. Knet introduces upgraded silicone liner to INCREASE the speed and REDUCE the time on installation of the cable.

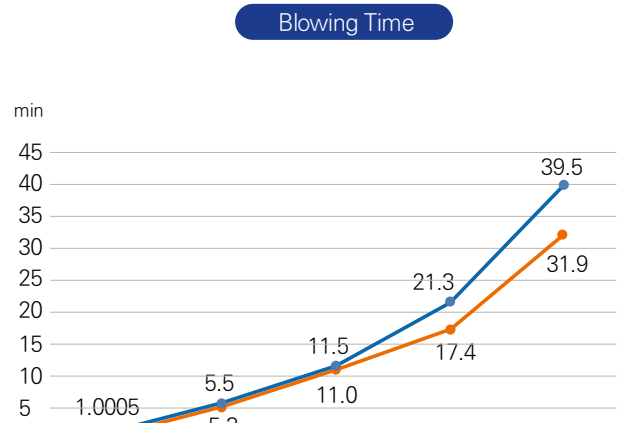
The graph shows the friction has been decreased by Avg. 20%



- Comparison of Coefficient of Friction using Microtube 14/10mm, 5/3.5mm
- Test method : GR 356 CORE (Telcordia)

## Faster than Ever!

Enhanced Silicone liner helps to speed up the blowing performance by reducing friction.



# Blulight™ | Thick Walled Duct

**THICK WALLED DUCT** is designed for direct burial by having thicker inner tube. It has advantage for easy and fast termination with thin outer sheath. The thickness of each inner tube allows individual tubes to be used direct buried solution. This item is suitable for any construction sites such as open cut, Micro trenching, Mini trenching and HDD. This product is usually recommended to the site which requires fast and easy sheath cutting during fiber branch off from the FCP.

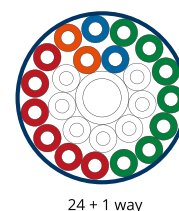
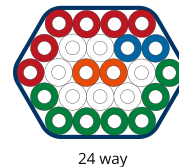
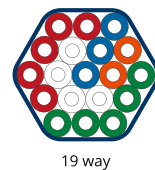
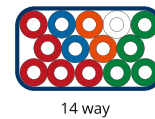
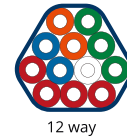


4/2.1mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	5.6	21	1,000	320
7way	13.6x12.5	92	2,000	40
12way	17.6x16.0	144	2,000	32
24way	25.6x19.5	263	1,000	32

7/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	9.0	52	2,000	104
2way	16.0x9.0	93	2,000	40
3way	16.0x15.1	128	2,000	32
4way	16.0x16.0	162	2,000	32
5way	23.0x15.1	195	2,000	24
6way	21.1x19.5	228	2,000	24
7way	23.0x21.1	258	2,000	21
12way	30.0x27.2	415	2,000	14
14way	37.0x21.1	485	2,000	14
19way	37.0x33.3	627	1,000	19
24way	44.0x33.3	777	1,000	14
24+1way	43.6x43.6	855	1,000	12

10/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.0	81	1,000	104
2way	22.0x12.0	149	2,000	32
3way	22.0x20.7	206	2,000	22
4way	22.0x22.0	264	2,000	21
5way	32.0x20.7	320	2,000	18
6way	29.4x27.0	374	2,000	14
7way	32.0x29.3	426	2,000	12

12/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	14.0	99	2,000	40
2way	26.0x14.0	182	2,000	24
3way	26.0x24.4	254	2,000	19
4way	26.0x26.0	325	2,000	18
5way	38.0x24.4	395	2,000	12
6way	34.8x32.0	463	2,000	12
7way	38.0x34.8	527	2,000	11





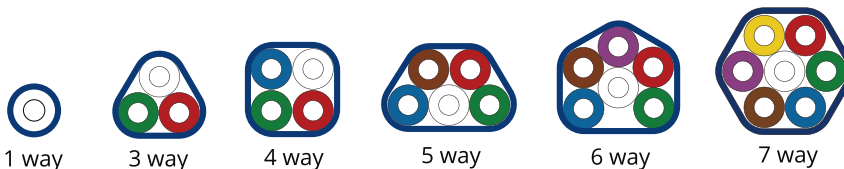


14/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	16.0	117	2,000	88
2way	30.0x16.0	216	2,000	21
3way	30.0x28.1	301	2,000	13
4way	30.0x30.0	386	2,000	12
5way	44.0x28.1	470	2,000	11
6way	40.2x37.0	551	1,000	13
7way	44.0x40.2	628	1,000	12

16/12mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	18.0	135	2,000	27
2way	34.0x18.0	250	2,000	19
3way	34.0x31.9	349	2,000	12
4way	34.0x34.0	448	2,000	11
7way	50.0x45.7	729	1,000	11

18/14mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	20.0	153	1,000	36
2way	38.0x20.0	283	1,750	18
3way	38.0x35.6	395	1,000	14
4way	38.0	508	1,000	12
6way	51.2x47.0	728	1,000	10
7way	56.0x51.2	828	1,000	10

20/16mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	22.0	170	1,000	33
2way	42.0x22.0	316	1,000	21
3way	42.0x39.3	443	1,000	12
4way	42.0	569	1,000	12
7way	62.0x56.6	929	500	11



Horizontal Directional Drilling  
Microduct – Thick Walled Duct

# Blulight™ | Flat Duct

**FOR MICRO-TRENCHING** with narrow width, Direct Bury Flat Duct is the most compatible item. The product itself can be placed vertically to fit on micro-trenching dimension.

The size of the product is relatively tiny which allows better shipping and handling with the smaller reel size. As Direct Bury Flat Duct has the same thickness of the Multi duct, customers can enjoy the same benefits of Multi duct.

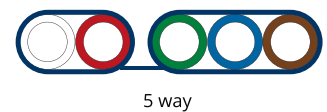
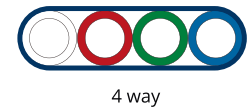
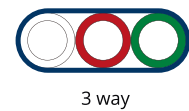


7/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	16.0x9.0	93	2,000	40
3way	23.0x9.0	135	2,000	33
4way	29.6x8.6	162	2,000	32
5way	41.2x8.6	210	2,000	24
6way	48.2x8.6	248	2,000	22
7way	55.2x8.6	286	2,000	21

10/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	22.0x12.0	149	2,000	32
3way	32.0x12.0	216	2,000	24
4way	41.6x11.6	264	2,000	21
5way	56.2x11.6	340	2,000	18
6way	66.2x11.6	403	2,000	13
7way	76.2x11.6	466	2,000	12

12/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	26.0x14.0	182	2,000	24
3way	38.0x14.0	265	2,000	19
4way	49.6x13.6	326	2,000	18
5way	66.2x13.6	420	2,000	12
6way	78.2x13.6	498	1,000	18
7way	90.2x13.6	576	1,000	14

14/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	30.0x16.0	216	2,000	21
3way	44.0x16.0	315	2,000	18
4way	57.6x15.6	388	2,000	12
5way	76.2x15.6	499	1,000	18
6way	90.2x15.6	592	1,000	13
7way	104.2x15.6	685	1,000	12



16/12mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	34.0x18.0	250	2,000	19
3way	50.0x18.0	364	2,000	12
4way	65.6x17.6	449	2,000	11
5way	86.2x17.6	578	1,000	12
6way	102.2x17.6	686	1,000	12
7way	118.2x17.6	794	1,000	11

18/14mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	38.0x20.0	283	1,750	18
3way	56.0x20.0	414	1,000	18
4way	73.6x19.6	511	1,000	13
5way	96.2x19.6	657	1,000	12
6way	114.2x19.6	780	1,000	10
7way	132.2x19.6	903	1,000	10

20/16mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	42.0x22.0	316	1,000	21
3way	62.0x22.0	462	1,000	18
4way	81.6x21.6	571	1,000	12
5way	106.2x21.6	736	1,000	11
6way	126.2x21.6	873	800	11
7way	146.2x21.6	1,011	800	10



Micro-trenching  
Microduct – Flat Duct

# Blulight™ | Link Duct

**LINK DUCT** is a lucrative solution for distribution point. Easy tear down characteristic of tube makes branch off work in distribution point can be done without cutting the primary tube and connector. Thus, installer can save time and additional material cost as they can connect each connection point without mid-span or branch connection. Like Direct Bury-Flat Duct, Direct Bury Link Duct is perfect for micro trenching application, it can be placed vertically with narrow width of the trenching 10-30mm. Moreover, with the wall thickness same as the Multi duct, the customer can enjoy all the same benefit of Multi duct.



7/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	20.2x8.6	95	2,000	37
3way	31.8x8.6	144	2,000	32
4way	43.4x8.6	193	2,000	24
5way	55x8.6	242	2,000	21
6way	66.6x8.6	291	2,000	19
7way	78.2x8.6	340	2,000	14
8way	89.8x8.6	389	2,000	13
9way	101.4x8.6	438	2,000	12



10/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	26.2x11.6	151	2,000	25
3way	40.8x11.6	229	2,000	21
4way	55.4x11.6	306	2,000	18
5way	70x11.6	383	1,000	21
6way	84.6x11.6	461	1,000	19
7way	99.2x11.6	538	1,000	18



12/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	30.2x13.6	185	2,000	24
3way	46.8x13.6	280	2,000	18
4way	63.4x13.6	375	2,000	13
5way	80.0x13.6	470	2,000	11
6way	96.6x13.6	564	1,000	14
7way	113.2x13.6	659	1,000	12



14/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	34.2x15.6	220	2,000	21
3way	52.8x15.6	332	2,000	13
4way	71.4x15.6	444	2,000	11
5way	90.0x15.6	556	1,000	13
6way	108.6x15.6	668	1,000	12
7way	127.2x15.6	780	1,000	11





6 way



7 way

16/12mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	38.2x17.6	254	2,000	18
3way	58.8x17.6	383	2,000	12
4way	79.4x17.6	513	1,000	14
5way	100.0x17.6	642	1,000	12
6way	120.0x17.6	772	1,000	11
7way	141.2x17.6	901	800	10

18/14mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	42.2x19.6	288	1,750	14
3way	64.8x19.6	435	1,750	11
4way	87.4x19.6	582	1,000	12
5way	110.0x19.6	729	1,000	11
6way	132.6x19.6	876	1,000	10
7way	155.2x19.6	1,023	800	10

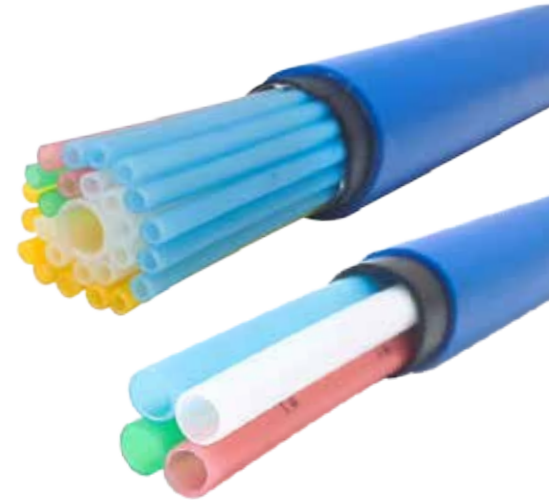
20/16mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
2way	46.2x21.6	322	1,000	21
3way	70.8x21.6	486	1,000	13
4way	95.4x21.6	651	1,000	11
5way	120.0x21.6	815	1,000	10
6way	144.6x21.6	980	800	10
7way	169.2x21.6	1,144	500	11



Backfill of Micro trenching  
Microduct- Link Duct

# Blulight™ | DB-HS Duct

**DIRECT BURY HIGH STRENGTH DUCT** is designed to endure harsh environment with high crush resistance. Even though it is solid product, it is very easy to bend or fix the tube inside of cabinet by having thin inner tube. The extra layer (total 2 layers of the outer sheath) is added to protect the thin wall of inner tube from external ground pressure. Moreover, it is very strong against lightning and electrical surge.



5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.0	98	2,000	44
2way	17.0x12.0	140	2,000	36
4way	19.1	200	2,000	29
7way	22.0	259	2,000	22
12way	27.9	385	2,000	18
19way	31.9	496	2,000	12
24+1way	37.5	639	1,000	14

8/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	15.0	140	2,000	36
2way	23.0x15.0	214	2,000	24
4way	26.3	320	2,000	19
7way	31.0	431	2,000	13
12way	40.4	680	1,000	12

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	17.0	166	2,000	32
2way	27.0x17.0	259	2,000	21
4way	31.5	410	2,000	12
7way	38.2	599	2,000	10

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	19.0	193	2,000	29
2way	31.0x19.0	305	2,000	19
4way	36.4	486	2,000	11
7way	44.2	712	1,000	12



1 way



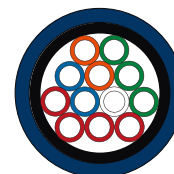
2 way



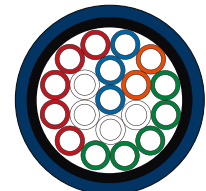
4 way



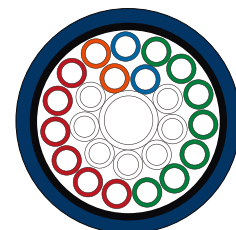
7 way



12 way



19 way



24+1 way

# Blulight™ | DB-AL Duct

**AS A DIRECT BURY PRODUCT**, Direct Bury Aluminum has the Aluminum tape which helps to block the water from the extreme wet soil condition. The outer sheath is made of rugged PE, providing excellent protection from the physical environment. Thanks to its characteristics, potential damages by crushing, external impact, etc. can be prevented.



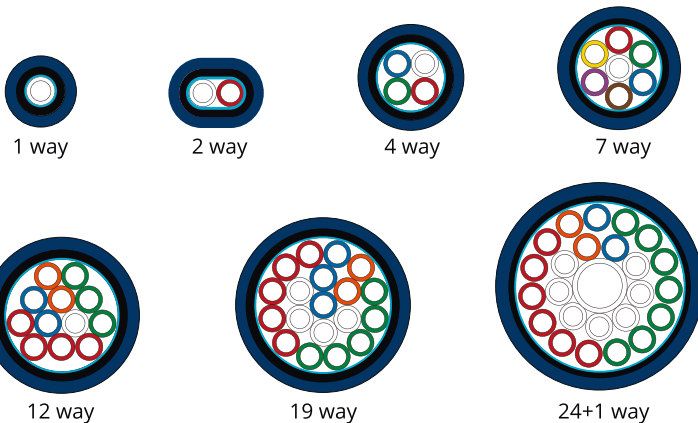
Microduct Product Line

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.4	112	2,000	40
2way	17.4x12.4	159	2,000	33
4way	19.5	227	2,000	29
7way	22.4	290	2,000	22
12way	28.3	425	2,000	18
19way	32.3	543	2,000	12
24+1way	37.9	691	1,000	14

8/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	15.4	159	2,000	36
2way	23.4x15.4	241	2,000	24
4way	26.7	358	2,000	19
7way	31.4	477	2,000	12
12way	40.8	741	1,000	12

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	17.4	189	2,000	32
2way	27.4x17.4	291	2,000	21
4way	32.9	506	2,000	12
7way	38.8	669	2,000	10

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	19.4	218	2,000	29
2way	31.4x19.4	342	2,000	19
4way	37.8	598	2,000	11
7way	44.8	795	1,000	12



Open Trenching in cold weather  
Microduct- DB Aluminum

# Blulight™ | DI-HS Duct

**DIRECT INSTALL HIGH STRENGTH DUCT** is designed for installation duct and subduct. This product will be installed in the existing infrastructure with relatively high crush resistance. Even though it is solid product, it is very easy to bend or fix the tube inside of cabinet by having thin inner tube. It is also strong against lightning and electrical surge.



5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	8.0	38	2,000	104
2way	13.0x8.0	62	2,000	88
4way	15.1	98	2,000	36
7way	18.0	139	2,000	32
12way	23.3	209	2,000	21
19way	27.3	293	2,000	18
24+1way	32.9	398	2,000	12

8/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	11.0	62	2,000	88
2way	19.0x11.0	106	2,000	33
4way	22.3	175	2,000	22
7way	27.0	257	2,000	18
12way	35.8	418	2,000	11

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	13.0	77	2,000	40
2way	23.0x13.0	132	2,000	30
4way	28.1	259	2,000	18
7way	34.2	383	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	15.0	91	2,000	36
2way	27.0x15.0	158	2,000	22
4way	33.0	310	2,000	12
7way	40.2	460	1,000	12



1 way



2 way



4 way



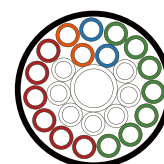
7 way



12 way



19 way

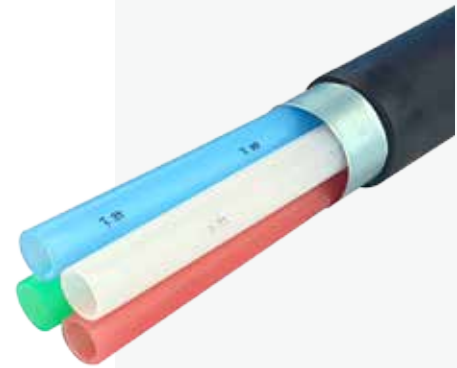


24+1 way



# Blulight™ | DI-AL Duct

**DIRECT INSTALL ALUMINUM DUCT** is for installation in existing duct and subduct. This product will be inserted into the existing infrastructure to maximize DI-AL advantage with the Aluminum tape which helps to block the water from the extreme wet soil condition.



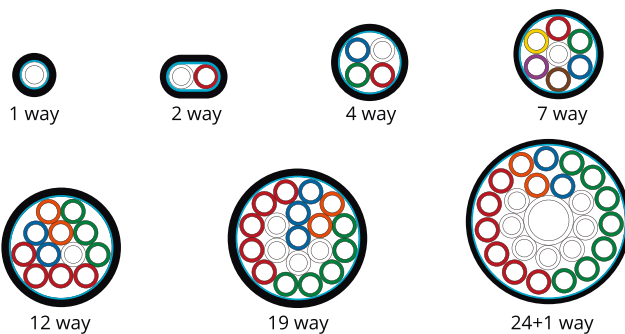
Microduct Product Line

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drm (m)	Number of drums in 40'
1way	8.4	50	2,000	104
2way	13.4x8.4	78	2,000	44
4way	15.5	123	2,000	36
7way	18.4	168	2,000	32
12way	23.7	246	2,000	21
19way	27.7	337	2,000	18
24+1way	33.3	447	2,000	12

8/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drm (m)	Number of drums in 40'
1way	11.4	79	2,000	44
2way	19.4x11.4	130	2,000	33
4way	22.7	210	2,000	22
7way	27.4	301	2,000	18
12way	36.2	477	2,000	11

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drm (m)	Number of drums in 40'
1way	13.4	97	2,000	40
2way	23.4x13.4	161	2,000	29
4way	27.9	279	2,000	18
7way	33.8	398	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drm (m)	Number of drums in 40'
1way	15.4	115	2,000	36
2way	27.4x15.4	192	2,000	22
4way	32.8	335	2,000	12
7way	39.8	479	1,000	12



Ducted Systems  
Microduct: Direct Install

# Blulight™ | Indoor Application LSZH

**INDOOR APPLICATION** requires the best quality of ducting pipe that can provide safety to the building. This method is the most appropriate for in-building infrastructure. Generally, the ducting pipe must comply with municipality and national authority standards and regulations on fire. The ducting pipe must be produced for retardant.

## Benefits

- Flame retardant
- Does not produce much smoke
- Has flexible sheaths
- Inner surface enables cable blowing
- Temperature resistance in very hot and cold area



### KNET UL rated microduct

Knet Indoor rated microduct products provide safe, flexible, lightweight, durable and easy-to-install pathways to deploy bare fiber and microfiber cables inside a multi-dwelling unit (MDU) and commercial building.

## LSZH

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	7.0	42	2,000	180
2way	12.4x7.4	80	1,000	130
4way	12.4x12.4	125	2,000	40
7way	17.4x16.1	184	2,000	32
12way	22.4x20.4	278	2,000	22
19way	27.4x24.7	400	2,000	18
24+1way	32.0x32.0	533	1,000	21

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.4	105	1,000	104
2way	22.4x12.4	183	2,000	32
4way	22.4x22.4	301	2,000	21
7way	32.4x29.7	460	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	14.4	120	1,000	96
2way	26.4x14.4	211	2,000	24
4way	26.4x26.4	348	2,000	18
7way	38.4x35.2	533	1,000	14



1 way



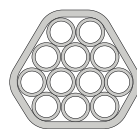
2 way



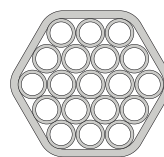
4 way



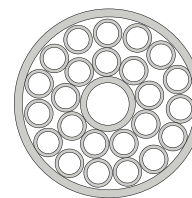
7 way



12 way



19 way



24+1 way

# Blulight™ | Indoor Application Hybrid LSZH

**HYBRID LSZH** is composed of LSZH outer sheath and PE inner tube. Hybrid LSZH is a cost effective and a fire protective solution. As an elastic product, it is convenient for installation and low smoke zero halogen characteristics that prevent smoking when fire occurred.

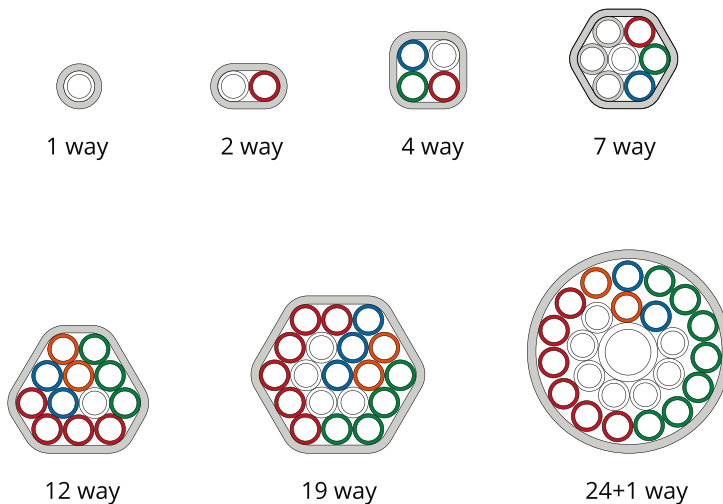


Microduct Product Line

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	7.4	41	2,000	130
2way	12.8x7.8	77	2,000	44
4way	12.8x12.8	114	2,000	40
7way	17.8x16.5	161	2,000	32
12way	22.8x20.8	236	2,000	22
19way	27.1x27.1	330	2,000	18
24+1way	32.7x32.7	438	1,000	19

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.8	94	1,000	104
2way	22.8x12.8	159	2,000	32
4way	22.8x22.8	249	2,000	21
7way	32.8x30.1	366	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	14.8	112	2,000	36
2way	26.8x14.8	190	2,000	24
4way	26.8x26.8	299	2,000	18
7way	38.8x35.6	441	1,000	18



Indoor Application  
Microduct: LSZH

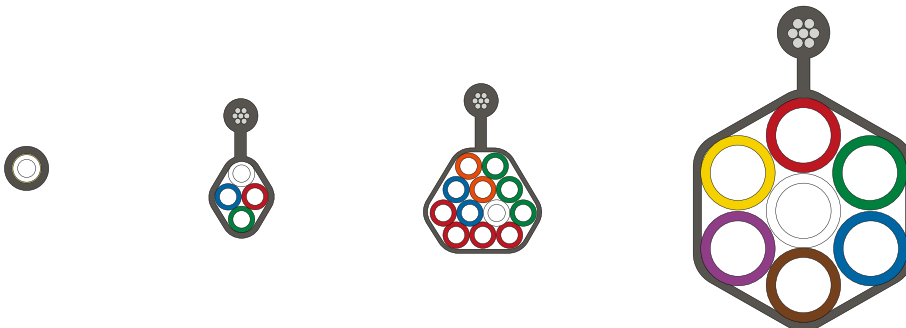
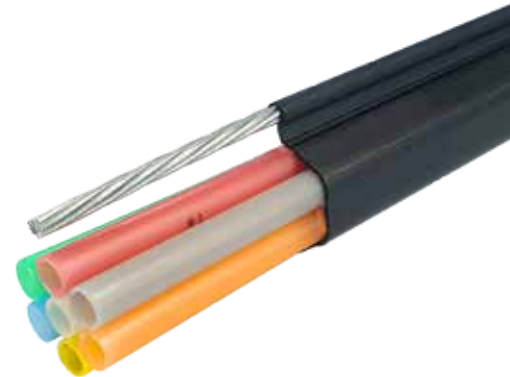
# Blulight™ | Aerial Application

AS AERIAL INSTALLATION PRODUCT, it can deploy cost effective network within a short time. It is very useful product and solution in case of installing existing telecommunication pole or power pole, if there is urgent construction due date and project owner cannot get road construction permit under special condition.



## Aerial Figure-8 Duct

THE FIGURE-8 SELF-SUPPORTING AERIAL MICRODUCT is used for conditions where microduct cannot be installed to underground such as rocky mountain area, stream crossing or road crossing area and the area where the existing pole exist with cost saving. This microduct has high UV resistance with black polyethylene sheath for outdoor use and their strength member is galvanized wire strand with high tensile strength to withstand severe load.



# Special Duct for Drop Area Specialty Duct



## For Drop Area

- Thick Sheathed duct
- MDD ( Micro Drop Duct)
  - Link LSZH Duct
  - Ruggedized Duct
  - Pre-Cabled Duct

## Specialty Duct

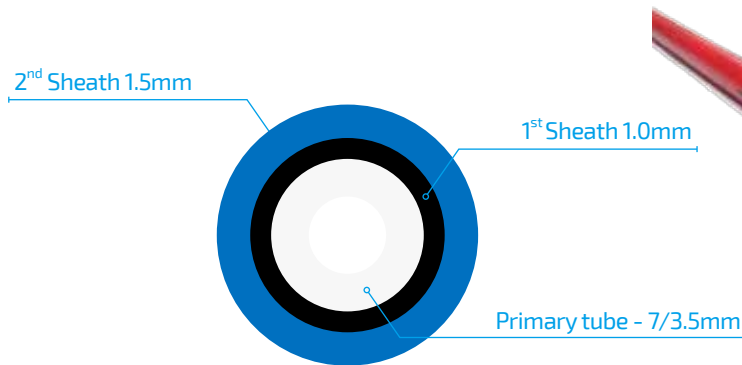
- Combined Duct
- Loose Bundled Duct
- Double Sheath duct
- Steel Armored Duct

# Blulight™ | Special Duct for Drop Area

## Thick sheathed duct

**THICK SHEATHED DUCT** has 2.5mm thickness of jacket with 2 layer to enhance crush resistance in drop area.

This product is very strong against external pressure and impact. Thanks to easy handling and installation, even unskilled workers can easily follow instructions and carry out Microduct laying and termination. It is designed for drop area which requires high crush resistance.

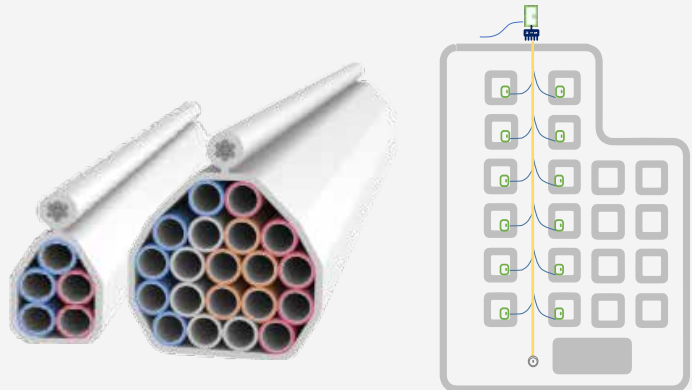


## MDD( Micro Drop Duct)

**WHEN HIGH RISE BUILDING OR APARTMENT** has pathway and self-support can be easy solution for its deployment. Using knet Micro drop duct is to save the time and cost with 15 min installation for 13th stories building.

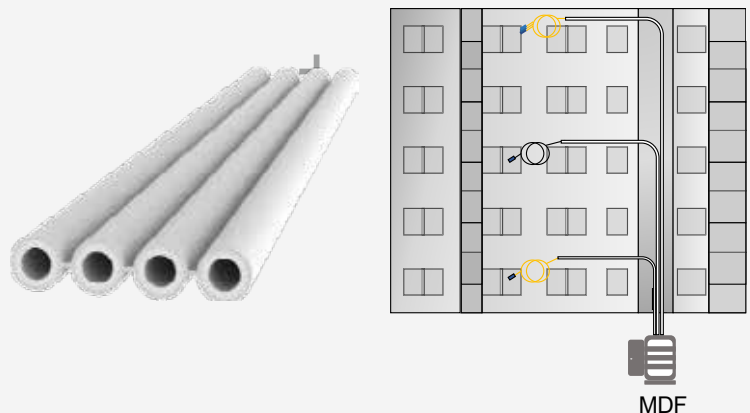
Korea Telecommunication Service provider piloted the solution prior to adapt their brown field.

The flame retardant material used. With multiple microducts, easy to branch to each unit on building



## LINK LSZH Duct

**LINK LSZH DUCT** is for indoor with flame retardant properties ( IRC 60332 part 1&3) Each tube can be torn off easily. It does not need mid-span installation like conventional method.



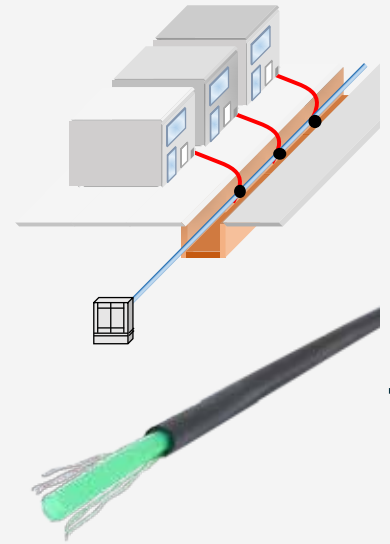
# Blulight™ | Special Duct for Drop Area

## Ruggedized Duct

Ruggedized Microduct is Brass coated steel wired duct to enhance crush resistance in drop area.

It is designed for drop area which requires high crush resistance. By deploying this product ISP can avoid unexpected cutting accidents in drop section. It can be installed in sidewalk, garden and schoolyard with soft trenching to save cost

- Easy installation with Soft trenching
- High crush resistance with brass coated steel wired
- Concrete wall, Wooden wall and Other fence Installation
- Side walk with GI pipe
- Cost effective solution to save installation time
- From the footpath or sidewalk to each MTU
- In case of wall or fence



### Installation location Examples

- City Street Shop : From the footpath or sidewalk to each MTU, operator want to deploy more robust MICRODUCT solution
- Rural Area : More rigid MICRODUCT solution should be deployed to protect against frequent relocation of gardening fence .

### Installation Method

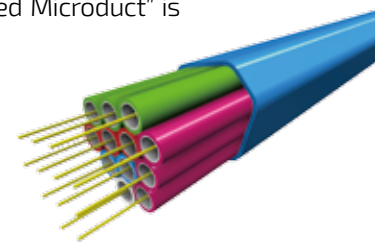


## Pre-installed cable Duct

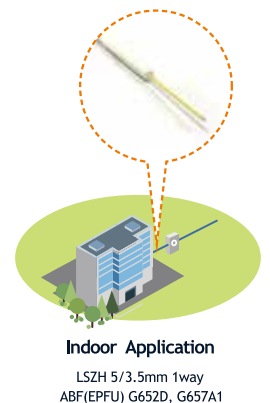
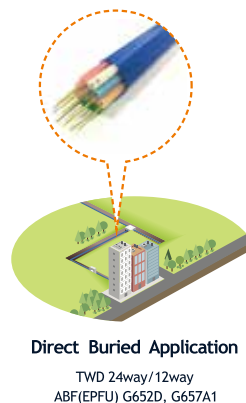
Deploying the duct and then installing cable can be costly and time-consuming. There is a solution to eliminate the installation of cable at job site to reduce the possibility of damage from handling. "Pre Cabled Microduct" is designed to save the cost & time. ABF/ABC is pre-installed during the microduct production.

### KNET "Pre Cabled Microduct" Application

this product can be used in direct buried, directional boring, aerial placement , pre-existing pipe and indoor application. Knet provides wide and various microduct configuration depend on the application. Here are the application cases.



Installation Procedure	Pre-Cabled Microduct	TWD with Blowing
Deployment of Microduct	O	O
Mid-Span (Window cut or Round cutting)	O	O
Connector and End-cap	O	O
Subscriber Connection with Tube	O	O
ABF pushing to Subscriber	O	x
Compressor preparing (Using Truck)	x	O
Compressor move to each connection	x	O
Blowing machine setting	x	O
Air Test/DIT test/Ball test	x	O
Fiber Blowing	x	O



# Blulight™ | Combined Duct

**BLULIGHT COMBINED DUCT** is a bundled microduct with different sizes of microduct. Using for both Feeder and Last-mile network with a combined duct is efficient in saving the cost. Depending on the network coverage and customer demands, you can install different sizes of fiber optic cables. Both the time and the cost of civil work dramatically decrease since one-time installation is possible



## Greenfield-Common Ducting

Service providers share "pathway" for building a Backbone network to save the civil works. They are assigned to use individual ducts needed and the size of the inner duct is designed for each provider's request.

**Example** - 3 different size of a tube ( 14/10mm, 12/10mm,10/8mm for different cable 144 , 288 C)



## Enterprise Market

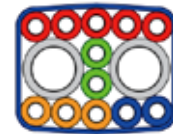
Enterprise Market – This type of combined duct can be used for an industrial complex where the distance between facilities is far from each other.

**Example** -14/10mm for 288 core are for Metro Backbone and 8/4mm for 2 core are for the distribution network in one complex.



## Full Network

Network owners can enjoy access to build networks easily and efficiently not only saving the cost to use combined duct of one pathway. Distribution and drop network will be built at the same time using 14/10mm and 7/3.5mm duct mixed



Installation  
Method

Direct Buried



Direct Installed



Aerial



# Blulight™ | Loose Bundled Duct

**BLULIGHT LOOSE BUNDLED DUCT** is composed of strong outer sheath facilitating loose tubes to provide easy and convenient installation. They are applicable with a range of microtubes depending on the available space of the outer jacket You can use a sealing cap or plug to fix the tube to prevent water or dust immerse




- Easy to install by simple stripping
- Convenient to branch off microtubes
- Possible to install a number of microtubes inside a outer duct
- Various options in choosing duct configuration
- Reduce the installation time and cost
- Relating connectivity kits are available


Out Duct Size 50mm	Out Duct Size 40mm
10/8mm X 4 micro tubes	10/8mm X 5 micro tubes
10/8mm X 7 micro tubes	10/8mm X 6 micro tubes
12/10mm X 7 micro tubes	12/10mm X 4 micro tubes

Installation  
Method

Direct Buried



Direct Installed





# Blulight™ | Double Sheath Multi Duct



HDD ( Horizontal Directional Drilling) has become commonplace as a method of installation after so much growth in the past decades. Utility owners or network owners have experienced a lot of benefit such as removal of traffic disruption and reduction of surface damage from HDD.

The pipe must withstand pullback loads with tensile pull forces, external pressure, and tensile bending stress. Of course, external service loads.

**KNET'S DOUBLE SHEATH MULTI DUCT** is designed with double layers of outer sheath applied to thick walled tube to maximize the prevention of duct damage during HDD Installation or Pulling.

- Double sheath double protection
- Prevention from excessive abrasion while installing the duct
- Crush and impact resistance
- Solution specialized in Horizontal Directional Drilling and Open Cut
- Applicable in harsh environment



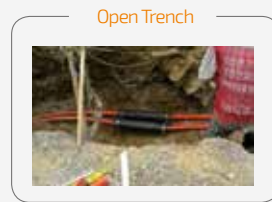
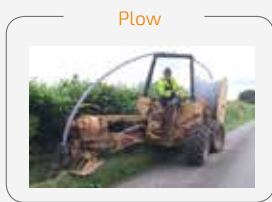
## 14/10mm 7way

Unwelcomed method of trenching was driving the customer to chose HDD in Philippines. Trenchless drilling requires the microduct withstanding pullback loads, external service loads and 14/10mm 7way with Double Sheath Multi duct were the right choice for this installation requirement



## 14/10mm 4way

This product were used for river crossing with HDD. Two layer of sheath meets the hydraulic requirement. Average 5000ft (1.5km) were installed under the river at one time in southern area in USA

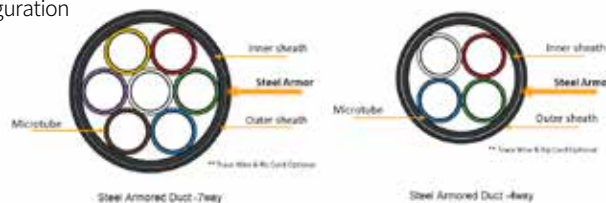


# Blulight™ | Steel Armored Duct

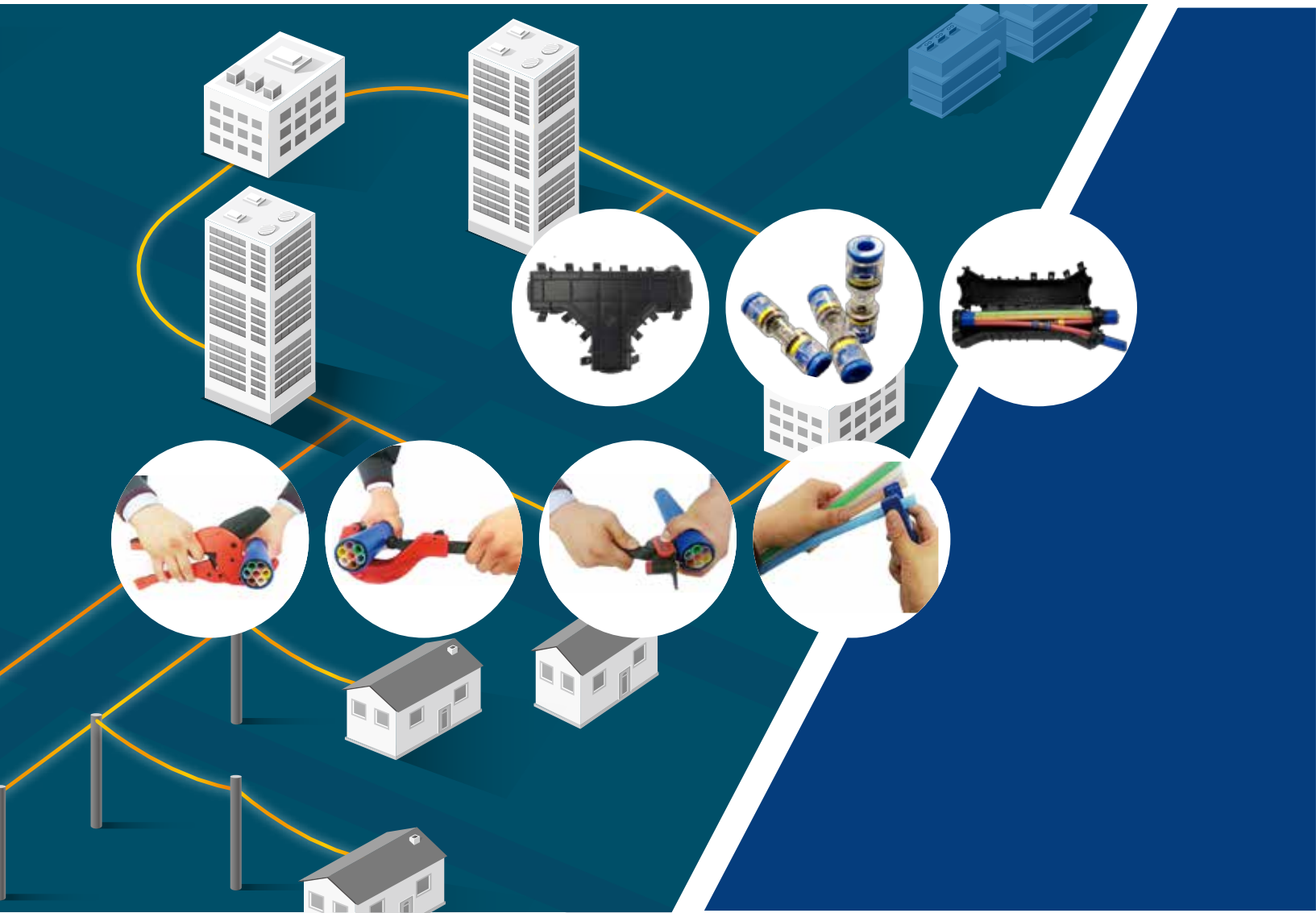


**BLULIGHT STEEL ARMORED DUCT** is composed of a steel sheath and HDPE jacket for superior protection against rodent, crush and water penetration

- Steel armored for rodent protection
- Various options in choosing duct configuration
- Crush and impact resistance
- Applicable in harsh environment



# Microduct Accessories & Tools



Knet provides a complete array of accessories to fulfill your fiber pathway needs including : Connectors, End Caps, Reducers, Tube Branching Units, Tools and Fiber Installation Machines

# Blulight™ | Accessories

## Straight Connector

- The Push-fit straight connectors manufactured with high quality materials and transparent body assure easy and quick installation. The connector can be re-used 10 times remaining maintained the high performance requirements for air-blown installation systems.



Size (mm)		Product Code
OD	ID	
3	2.1	RC3AU
4	2.1	RC4AU
5	3.5	RC5AU
7	3.5	RC7AU
8	6	RC8CU
10	8	RC10BU
12	10	RC12BU
12	8	RC12AU
14	12	RC14CU
14	10	RC14AU
16	12	RC16AU
18	14	RC18AU

## Connector Cover

- The connector cover is typically used in place of a duct closure to protect the connector and the end cap for direct burial



Size (mm)	Product Code
5	RCC5U
7	RCC7U
8	RCC8U
10	RCC10U
12	RCC12U
14	RCC14U
16	RCC16U
18	RCC18U

## End Cap

- The End Cap for permanent or temporarily sealing of unused microducts to prevent obstacles such as water, mud, dust and so on. The body is transparent for easy fault location and fix the problem easily during installation.



Size (mm)	Product Code
3	RE3AU
4	RE4AU
5	RE5AU
7	RE7AU
8	RE8AU
10	RE10AU
12	RE12AU
14	RE14AU
16	RE16AU
18	RE18AU

## Reducer Connector

- The Reducer allows interconnection between microducts that are difference in outer diameters. Usually, this is used in the point of transition from Direct Bury to Direct install microducts entering the office, house.



Size (mm)		Product Code
7/4	4/2.1	RR74AU
7/3.5	5/3.5	RR75BU
10/6	8/6	RR10GU
12/10	5/3.5	RR12AU
12/10	10/8	RR12HU
14/10	12/8	RR14FU
14/10	12/10	RR14HU
16/12	14/10	RR16DU

## Gas Block Connector

- The design of Gasblock is to prevent the gas leaking at the point where the connection between a duct and fiber optic cable inside.
- Gasblock connector can be installed at home, office, inside building not to allow the inflow of materials which has the harmful gas, water and dust.



Size (mm)		Product Code
MD	Cable	
5	1-2.5	RGAAU
7	1-2.8	RGBAU
12	3-6	RGFAU
12	6-8	RGFBU
12	8-10	RGFCU
14	3-6	RGHAU
14	6-8	RGHBU
14	8-10	RGHCU
14	10-12	RGHDU
16	3-6	RGJAU
16	6-8	RGJBU
16	8-10	RGJCU
16	10-12	RGJDU

## Bulkhead Connector

- The Bulkhead Connector is used for distributing and arranging the inner tubes of bundled microduct on the frame combined by Mounting Rack and Patch Panel, which is mostly installed in MDF room of the building. The structure of bulkhead is to fix the connector the hole of the Patch Panel. It's also suitable to apply in Air Blown System.



| Tube patch panel |

Size (mm)	Product Codes
5/3.5	RBC5U

## I/Y, T, D type Branch Closure

- It is designed by modular method to change the length of closure and branch direction. It is possible to assemble or dis-assemble without any special tools. I/Y, T & D type branch closure is available and maintenance can be done without cutting the ducts, and can be completed only by reopening upper modular part. I/Y, T & D type branch closure is designed to connect two microducts and to branch-off tubes without any interruption of connectivity.

Product Code	Product	Size (mm) W x L x H	Application Duct	Weight (g)
RTYXK	I/Y Type	400 x 113 x 76	Max. $\phi$ 45	584
RTTXK	T Type	310 x 195 x 80	Max. $\phi$ 36	656
RTDXK	D Type	450 x 108 x 187.25	Max. $\phi$ 50	830



# Blulight™ | Tools

## Microduct Cutter



- Microduct Cutter is used for precise cutting of PP and PE pipes with minimum effort. Knife blades deliver clean and straight cuts on pipe diameters up to 63 mm and especially for all the current plastic types used in installation. The aluminum construction guarantees precise operation and long professional service use.

Product Code	Model	Duct Size (mm)	Dimension (mm)	Weight (g)
TDC3R	TC 63	0 – 63	285 x 140 x 25	700

## Microduct Sheath Remover (Slitter)



- The Microduct Sheath Remover(Slitter) is used when dismantling the outer sheath of a double-sheathed microduct (direct buried)

Product Code	Dimension (mm)	Stripping Capacity (mm)	Weight (g)
TSLAX	16 x 40 x 150	> 25	165

## Microduct Round Cutter



- This Telescopic ratchet pipe cutter is used for precise cutting of PP, PE pipes as well as sound-insulated drain pipes.

Product Code	Model	Duct Size (mm)	Cutting depth (mm)	Weight (g)
TDC3R	TC 67 PL	6 – 67	7	700

## Microduct Tube Cutter



- The Microduct Tube Cutter is used in the situation of cutting a tube cleanly 90° in order to make a connection with another tube perfectly.

Product Code	Tube Size (mm)	Dimension (mm)	Weight (g)
TDCBC	3 – 14	79 x 24 x 33	32



Microduct Cutter



Microduct Round cutter



Slitter



Microduct Tube Cutter

## Blowing Machine



The Microjet PRM-196 is designed for the installation of FO fibers and cables into microducts, either by the push-pull method, or by pulling with a traction line.

- Applicable outer diameter of ABF or ABC : 0.8 ~ 8(mm)
- Applicable outer diameter of duct : 3 ~ 14(mm)
- Size (L x W x H) : 285 x 250 x 335mm
- Weight : 6.7kg



The MINIJET is designed for the laying of FO cables into ducts with the jetting or floating methods. These methods are combined with an additional mechanical pushing force, giving the best blowing performance.

- Applicable outer diameter of ABF or ABC : 4 - 16(mm)
- Applicable outer diameter of duct : 7 - 42(mm)
- Size(L x W x H) : 520 x 293 x 373mm
- Weight : 20kg



The ULTIMAZ pusher is designed for the installation of FO fibers and cables into microducts using a pushing, push-pull or jetting method.

- Applicable outer diameter of ABF or ABC : 0.8 - 4(mm)
- Applicable outer diameter of duct : 3 - 12.7(mm)
- Size(L x W x H) : 210 x 100 x 148mm
- Weight : 3.85kg

## Compressor



The M17 compressor is specifically for use with the MINIJET, MICROJET cable blowing machines.

- Air production volume : 1000 liters/min(35.3cfm)
- Max. pressure : 15bar
- Power source : Gasoline engine
- Size (L x W x H) : 1390 x 800 x 790mm
- Weight : 192kg



The Premium compact 160/4w is suitable for blowing cable on small building sites with Ultimaz blowing machine.

- Air production volume : 160 liters/min
- Max. pressure : 20bar
- Power source : Gasoline engine
- Size (L x W x H) : 350 x 560 x 560mm
- Weight : 31kg

## Fiber Fusion Splicer



Core-alignment splicer is one of the most needed fusion splicers in the market using Digital Analysis Core Alignment System (DACAS). By double-tapping the screen, users can zoom in and out the fiber image during the connection. This splicer also is compatible with SOC (Splice-On-Connectors) with maximum work efficiency through the fast heating time of 13s. Moreover, the 3 LED lights provide bright splice condition to the users working under dark environment. This splicer is the new industry standard of core-alignment splicer in the telecommunications industry.

# Air Blown Cable & Fiber



Blowing cable is one of the biggest benefit of using microduct.  
Cables can be blown directly from point to point in a single run over great distances  
Blowing distance can reach approximately upto 2Km.

# Blulight™ | Fiber Optic Cable - ABF/ABC

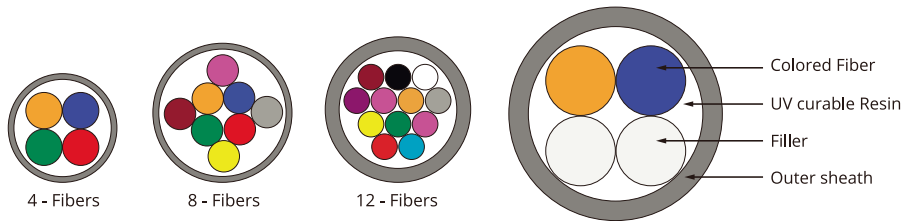
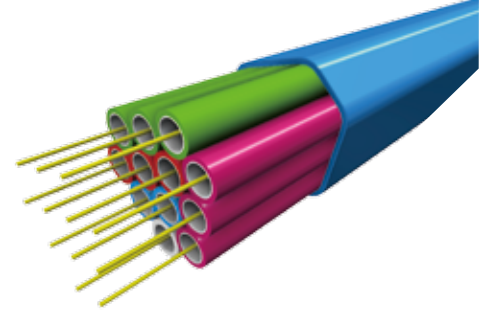
One main component of Microduct Solution is Air Blown Fiber/ Cable ( or Micro cable) . To blow /jet the cable into microduct, ABF/ABC can be used.

As called as " Air Blown Solution" , it is offering reduced cost, increased design flexibility and other many advantages which can't be competitive by conventional fiber cables.

## ABF (Air Blown Fiber)

It is a type of cable that has 2~12 cores With 1.2mm~1.6mm of outer diameter and also can be installed in microduct by air blowing method.

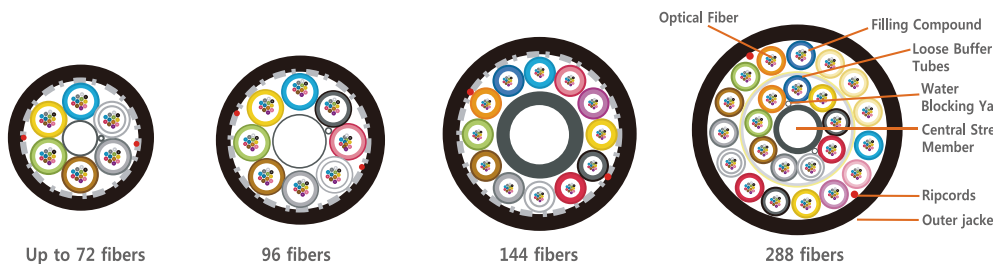
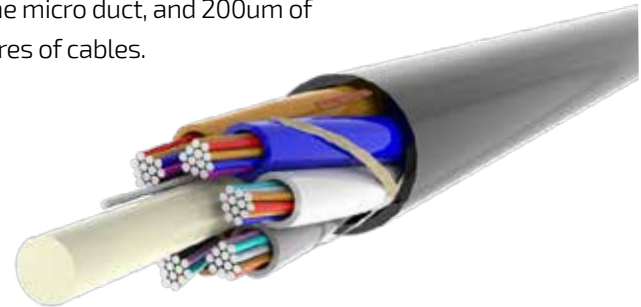
- For distribution or drop network
- Lightweight & flexible without strength member
- G.652, G.657 or mixed
- 2, 4, 8, 12core with 1~1.6mm diameter



## ABC (Air Blown Cable)

It is a type of cable that is installed by air blowing method in a microduct. There are various types of Air Blowing Cables that can be applied according to the inner diameter of the micro duct, and 200um of outer sheath is also possible to be applied for materializing the multi cores of cables.

- For feeder or distribution network
- G.652, G.655 or mixed
- GRP central strength member(CSM)
- Up to 432 core of 8.7 ~ 11mm diameter
- 12F, 24F,48F,72F,96F,144F,216F,288F,432F



Fiber	250μm, G652.D / G657.A1			200μm, G657.A1		
Fiber Count	Up to 72 F	96~216 F	288 F	Up to 144 F	288 F	432 F
Cable Diameter	5.8	6.5 ~ 8.0	10.2	5.1 ~ 6.4	7.9	8.7



# Blulight™ | Air Blown Cable & Fiber

## Advantage of Micro Cable

### Easy to handle and maintain

- 1) It is light and thin and is suitable for pneumatic installation.
- 2) It is easier to handle than conventional cables.
- 3) Need smaller ducts and handholes

Number of Fibers	Cable	72c	96c	144c	192c	216c	288c	Average Difference
Cable Diameter (mm)	Air Blown Cable	5.2	6	7	8.1	8.1	9.4	Avg. 50% Smaller
	Conventional Cable	11	13	16	18	18	18	
Approx. Cable Weight (kg/km)	Air Blown Cable	21	32	41	51	51	77	Avg. 80% Lighter
	Conventional Cable	129	174	257	342	342	342	



Conventional OSP Loose tube  
72 Core 11mm, 129kg/km



ABC Loose tube 72 core  
5.2mm, 21kg/km



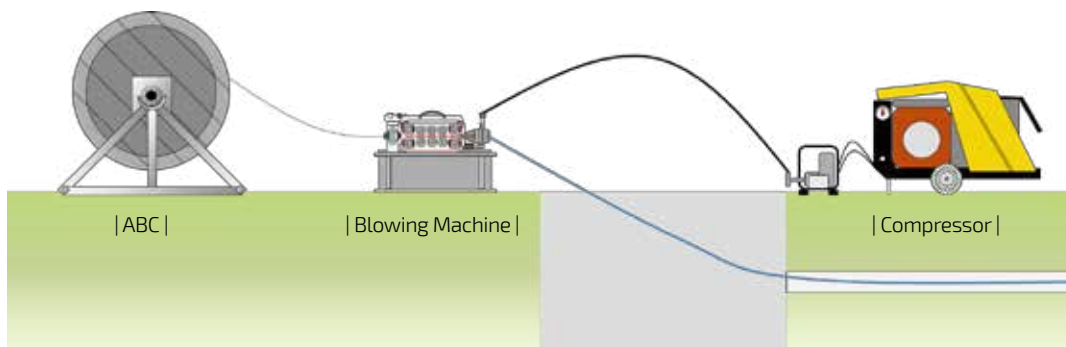
Smaller Reels



Smaller ducts and handholes

### Advanced Installation Method – Air Blowing/Jetting Installation

- 1) Install the cable with compressed air from the equipment.
- 2) No cable is installed physically, and no core disconnection occurs.
- 3) Advanced technology drives costing saving from labor and time



Comparison of Conventional Pulling VS Air Blowing

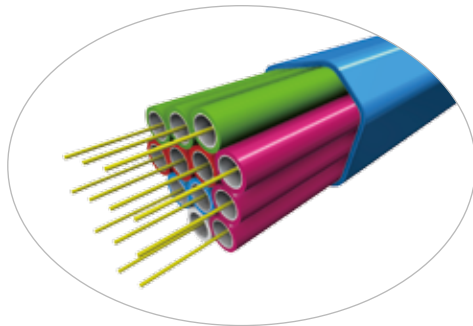
Division	Conventional Pulling method	Air Blown Solution
Required number of people	6~ 8 Person	2~3 Person
Maximum installation distance	250m	2,000m
Speed	1~10m/min	60~100m/min
Installation method	Manpower	Air Blowing

# Blulight™ | Microduct VS ABF/ABC

Recommended tube size based on ABF/ABC outer diameter, application and installation method. Below table helps to select the right size of microduct but need to consult with our staff to chose the proper size of tube

## Recommended tube size for ABC

Fiber Type	ABF			ABC					
	250μm, G652D / 200μm G657 A1			250μm, G652D / 200μm G657 A1			200μm, G657 A1		
Fiber Count	2 & 4 F	8 F	12 F	Up to 72 F	96 ~216 F	288 F	Up to 144 F	288 F	432 F
Cable Diameter(mm)	1.2	1.4	1.6	5.8	6.5 ~ 8.0	10.2	5.1~ 6.4	7.9	8.7
Tube Size (ID/mm)	2.1, 3.5, 4.0			8	10	12	8	10	12



Example – Last Mile Network 5/2.1mm 12way  
ABF 4F (1.2mm) X 12 tubes Total 48Core



Example - Feeder TWD 14/10mm 7way  
ABC – 200um 288F ( 7.9mm ID of cable)  
Total 2,016 Core

## Cable Spec VS Microduct Configuration

Cable Type	Cable Count	Cable size (OD/mm)	Microduct (ID/mm)	Microduct Configuration	Microduct Configuration
ABF	2 ~12 F	1.2 ~ 1.6mm	2.1mm	4/2.1mm	1, 7, 12, 24way
	2 ~12 F	1.2 ~ 1.6mm	3.5mm	7/3.5mm	1, 2, 3, 4, 5, 6, 7, 12, 14, 19, 24, 24+1way
	2 ~12 F	1.2 ~ 1.6mm	3.5mm	5/3.5mm	1, 2, 4, 7, 12, 19, 24+1way
ABC	Upto 72 F (250μm)	5.8mm	8mm	12/8mm	1, 2, 3, 4, 5, 6, 7way
				10/8mm	1, 2, 4, 7way
	Upto 144F (200um)	5.1 ~ 6.4mm	8mm	12/8mm	1, 2, 3, 4, 5, 6, 7way
				10/8mm	1, 2, 4, 7way
	96 ~216F (250μm)	6.5 ~ 8.0mm	10mm	14/10mm	1, 2, 3, 4, 5, 6, 7way
				12/10mm	1, 2, 4, 7way
				14/10mm	1, 2, 3, 4, 5, 6, 7way
				12/10mm	1, 2, 4, 7way
288F (200μm)	7.9mm	10mm	14/10mm	1, 2, 3, 4, 5, 6, 7way	
288F (250μm)	10.2mm	12mm	16/12mm	1, 2, 3, 4, 5, 6, 7way	
432F (200μm)	8.7mm	12mm	16/12mm	1, 2, 3, 4, 5, 6, 7way	

# Connectivity Product & Accessories / Tools



KNET connectivity solution enables to fast fiber connection from Data Central office throughout the Building & House. Reduce the Installation time by guarantee high quality and performance.

## MDU/SDU Solution

KNET passive connectivity solution enable to fast fiber connection throughout the Building & House. Reduce the Installation time by guarantee high quality and performance

### Solution Feature

- Push cable and related connectivity can be applicable.
- Pre-installed Duct and Pre-Connectorized cable can be combined
- Mid-span solution and Flame retardant material.

### Here are the products

High capacity and compact size street cabinet, Optical Distribution Frame, Plastic manhole, Splice Closure (Dome & Rectangular type), PLC Splitter, Optical outlet, Optical patch cord, Field assembled connector.



### Various Microduct

MDD(Micro drop duct) Link LSZH, DI HS and Pre-Installed LSZH, Ruggedized duct and dual layer drop duct.



## Aerial Solution

KNET aerial connectivity solution is designed for an optimized deployment of FTTH access networks. It can be customized based on customer requirement for complicated last mile.

### Solution Feature

- Various options are available upon site condition
- More Robust and durable product
- Various Fitting product can be provided upon customer request

### Here are the products

Wall Mount Box, Splice Closure (Dome & Tap type), PLC Splitter, Optical outlet, Optical patch cord, Field assembled connector, Aerial installation accessories (Dead end for ADSS cable, Universal pole bracket, Steel band etc)



### Various Microduct

Aerial Duct, Pre cabled Aerial duct, Ruggedized duct

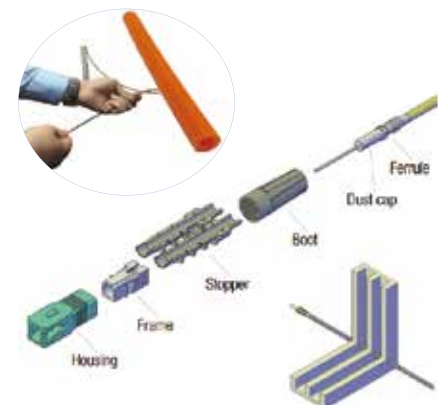


## Drop push Solution

KNET specially design Push cable with factory ferruled connector. Besides, All related passive components can be provided to maximize push solution

### Solution Feature

- Fast and easy Installation with push cable and its suitable Microduct.
- Pre-Connectorized option can be applicable
- Push performance are guaranteed



## In-Line Splice Closure

### OFC –IB



It protects fiber optic splicing joint in various installation conditions such as wires, manhole, ducts and direct buried. It is specially designed for FTTH network and applicable to multi branching installation meeting the requirements in each points of network. In addition, it provides with easy and reliable installation and high mechanical strength against any environmental condition.

Model No.	Splicing capacity	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OFC-IB04	4	2	1	8/3.5	Aerial Underground Pole	IP68
OFC-IB08	8	4	1	8-10/3.5		
OFC-IB12	12	4	1	2008-10-03		
OFC-IB24	24	4	4	8-14/3.5-8		
OFC-IB48	48	6	4	15-17/3		
OFC-IB72	72	6	4	18-20/3		
OFC-IB144	144	8	6	8-24/3.5-8		
OFC-IB288	288	6	6	32-34 / 6.5		

## Dome Splice Closure

### OFC –DH

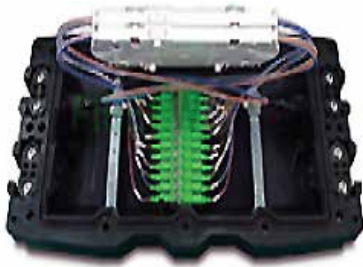


Fiber Optic Splice Closure for Dome Type protects fiber optic cable and provides with fast and easy re-entry working. Aerial, manhole, ducts, wall, and pole installation are available and it provides with reliable sealing performance protected by a ribbed dome cover made of Polypropylene that has high mechanical and environmental features. with its 6-8ports, It is applicable for midspan branching method.

Model No.	Splicing capacity	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OFC-DH48	48	6(2/4)	6	8-22mm	Aerial, Direct Buried Underground Pole	IP68
OFC-DH96	96	6(2/4)	4	8-24mm		
OFC-DH144	144	9(1/8)	12	8-28mm		
OFC-DH288	288	7(1/6)	12	8-29mm		
OFC-DH600	600	7(1/6)	10	8-29mm		

# Connectorized Splice Closure

## OFC –CN



The Cross-Connect Closure was designed for applications requiring connectorization or cross connecting in the outside plant network. Additionally, the Cross-Connect Closure was configured to allow for convenient and safe storage of uncut buffer tubes in the feeder cable, while providing individual connectivity to the fibers of the drop cables.

Model No.	Splicing capacity	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OFC-CN08	12	4	8	3.5-14mm	Aerial Underground Pole	IP68
OFC-CN12	24	4	12	3.5-20mm		
OFC-CN16	24	6	16	3-19mm		
OFC-CN24	24	8	24	3.5-20mm		
OFC-CN32	24	6	32	3-20mm		

## OFC –TA



Model No.	Splicing capacity	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OFC-TA08	72	3	8	3.5-13mm	Aerial Pole	IP65
OFC-TA16	24	3	16	3-19mm		

## Termination Box – Outdoor

### OTB-O



Mounted to outside or inside wall of building to distribute and connect optical cable for distribution of subscriber. It is designed with controls that maintain the fiber bend radius throughout the unit on the segregated customer and provider sides. For convenient cable management, they provide termination, splicing and storage functions for fiber optic cable systems

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	IP grade
OTB-08	3/16	8	3-16mm	Aerial Pole, wall	IP65
OTB-012	2/12	12	3.5-13mm		
OTB-016	3/16	16	3-16mm		

### OTB-OM



It is designed to manage fiber connections and fiber splices with ease of maintenance for installers. Cassette type splitter module allows reduced installation time at the field. It allows easy expansion of lines for subscribers. It is suited for pole or wall application.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	IP grade
OTB-08M	3/12	8	3-16mm	Aerial Pole, wall	IP65
OTB-024M	3/24	16	3-17mm		
OTB-032M	3/32	32	3-18mm		

# | Termination Box – Outdoor

## OTB-08B



The termination box is designed and constructed to be suitable for outdoor installation. The housing is sufficiently sturdy to withstand typical handling and installation procedures. The design and layout of the cable guides promote an efficient and ordered positioning of the cable within the box.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-08B	2/8	8	3.5-13mm	Aerial, pole, wall	IP55

## OTB-16B



Designed to manage fiber connections and fiber splices with ease of maintenance for installers. It allows easy expansion of lines for subscribers. It is suited for pole or wall application.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-16B	3/18	16	3-16.5mm	Aerial, pole, wall	IP65

## OTB-02P



Placement of the incoming cables allow convenient access for installation, maintenance and subsequent termination of additional secondary cable

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-02P	1/2	2	3.5-5mm	Aerial, pole, wall	IP55



## Termination Box – Indoor

### OTB-I08



Indoor Optical Termination Box connects and distributes the FTTH fiber optical cables for subscriber distribution with being mounted on the inside of a middle terminal box in the communal premises.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-I08	2/8	8	3-10mm	pole, wall	IP20

### OTB-FP4



FTTH 4C Termination outlet box is used for final termination for FTTH Telecommunication. It can hold 4C SC adaptor & pigtailed, 8C LC adaptor & pigtailed (LC Duplex)

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-FP4	2	4	3-15mm	pole, wall	IP20

### OTB-FP2



The Outlet has a simple design and enough work space to arrange clearly for cable management, and engineered fiber routing protect bend radius through the unit to endure signal integrity

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/ Drop)	Application	IP grade
OTB-FP2	2	2	3-16mm	pole, wall	IP20

# | Distribution Frame – Rack mounted

## ODF-U



Provide efficient cable connections among outside plant cable equipment in the buildings and communication facilities, ODF integrates fiber splicing, storage and cable connections together in single unit. The frontal access and the unique adaptor arrangement design will increase your work speed and maintenance efficiency

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	Unit
ODF-2U48	1	48	8/22mm	Rack mount	2U
ODF-3U24	1	24	8/22mm		3U
ODF-4U72	3	72	8/22mm		4U
ODF-4U96	4	96	8/22mm		4U
ODF-4U144	6	144	8/22mm		4U

## ODF-1U24W



Optical Fiber Distribution arrange the adaptor mount panel, the optical fiber connecting panel and optic fiber patch cords to connect and switch optical fiber cables and the optic fiber transmission tool.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	Unit
ODF-1U24W	1	24	8/22mm	Rack mount	1U

## Distribution Frame – Rack mounted

### ODF-1U24D



Fiber Distribution Frame provides with a comprehensive solution for cable management and storage in the long-term success of the network. For convenient management, it provides with the termination, Splicing and storage functions in the fiber optic cable system.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	Unit
ODF-1U24D	1	24	8-32mm	Rack mount	1U

### FDF



- The top cover is removable for easy installation
- Easy to control the loose tube and jumper cord loops
- High quality & rust-proof with no sharp edges

Model No.	No of Tray	No. of Connection	Cable Dia (Main/Drop)	Cable Dia (Main/Drop)	Unit
FDF-24	1	12	8-32	Rack	3U
FDF-48	2	32	8-32	Rack	5U
FDF-72	3	36	8-32	Rack	4U
FDF-96	4	48	8-32	Rack	4U
FDF-144	6	96	8-32	Rack	4U



Provide efficient cable connections among outside plant cable equipment in the buildings and communication facilities, ODF integrates fiber splicing, storage and cable connections together in single unit. The frontal access and the unique adaptor arrangement design will increase your work speed and maintenance efficiency

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	Unit
ODF-1U24W	1	24	8/22mm	Rack mount	1U

# Distribution Frame – Wall mounted

## ODF-W



Wall mounted Fiber Distribution Frame is a device which consists of patch panel and tray. It is connected with optical cable and fiber optic termination or fiber optic transmission system.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	IP
ODF-W12	12	12	8/22	Wall	IP 53
ODF-W32	32	32	8/22		
ODF-W36	36	36	8/22		
ODF-W48	48	48	8/22		
ODF-W96	96	96	8/22		
ODF-W120	120	120	8/22		
ODF-W144	144	144	8/22		

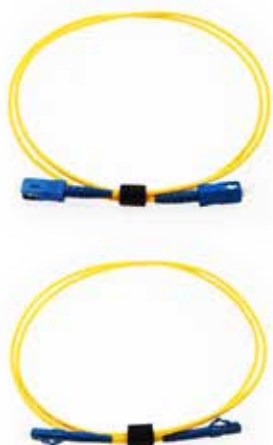
## ODF-WN



MINI OFD is designed to manage fiber splices and patching of fiber links with ease of maintenance for installers. This mini wall mount optical fiber distribution is suited to data application in controlled environments.

Model No.	No. of Cable port	No. of Connection	Cable Dia (Main/Drop)	Application	Unit
ODF-WN4	10(2/8)	4	6-15mm	Wall	-
ODF-WN8	10(2/8)	8	6-15mm	Wall	-

## PATCH CORDS



Fiber optic patch cords provide with interconnections between transmission equipment and distribution panels, equipment to equipment and distribution panels to OSP cables. Different optical connectors such as FC, SC, ST and LC can be assembled on specified fiber cables. Our products are manufactured under the strict quality standards through several inspections and testing processes for customer's satisfaction.

- Insertion Loss  $\leq 0.2$  dB
- Return Loss SPC  $\leq 40$  dB UPC  $\leq 55$  dB APC  $\leq 65$  dB
- Durability  $\leq 0.2$  dB (500times)
- Operation Temperature. Stability  $\leq 0.2$  dB (-40 C°~ +85 C°)

Connector type	Fiber	Jacket material	Mode	Cable Dia (Main/Drop)	No Of Fibers	Length (meter)
SC / LC / FC / ST / MTRJ / MU / MTP	G652D	PVC	SM	0.9	1-24C	Optional
	G657A1	LSZH	OM1	2		
	G657A2		OM2	3		
			OM3	3*2 Flat		

## PRE-CONNECTORIZED CABLE KITS



Pre-connectorized cable kits are designed to use for pre-terminated fibers with Optical Interior Termination Device for FTTH applications. Composed of 1, 2 or 4 fibers directly connected in Adaptors inside a terminal socket to ensure rapid installation.

- CPR Certified

Item (SPPT)	Cable	Sheath color	Fibers	Adaptor	Ferrule	Cable length
Precon-KIT	2.0mm	Black	1 - 4	SC	PC	Optional
	3.0mm round	White		LC	APC	
	3*2mm flat	Optional		FC		
	4.2mm					
	4.5mm					

## PLC SPLITTER



Bare



Mini module



Cassette



ABS Box



Rack type

The 1XN Planar Splitter has high performance with very low insertion loss, excellent Uniformity, Low PDL and flat wavelength operation. The splitter is pigtailed with single mode Fibers and compact package. It's available in 2, 4, 8, 16, 32 and 64 channel configuration, with connector type open to customer specifications.

- 1x4, 1x8, 1x16, 1x32 and 1x64 configurations available
- 2x4, 2x8, 2x16, 2x32 configurations available
- Telcordia GR-1209 & GR-1221 qualified
- Low insertion loss, PDL, Back Reflection
- High uniformity
- Compact package

Item	Type	Connector	Cable (mm)	Splitter	No of Connection
PLC	B / BARE	None	0.25	1*2	24
	M / MINI MODULE	SC/UPC	0.9		48
	C / CASSETTE	SC/APC	2	~	72
	ABS / ABS BOX			2*32	96
	R / RACK				144

## ADAPTOR



SC



LC

Fiber optic adapters provide with interconnections between transmission equipment and distribution panels, equipment to equipment and distribution panels to OSP cables. Different optical adaptors such as FC, SC, ST and LC can be assembled on specified connectors. Our products are manufactured under the strict quality standards through several inspections and testing processes for customer's satisfaction.

- Insert Loss  $\leq 0.2$  dB
- Mating Durability  $\leq 0.2$  dB (500times)
- Operation Temperature. Stability  $\leq 0.2$  dB (-40 C° ~ +85 C°)

Item	Type	Ferrule	Spec
FOA	SC, LC, FC	UPC	SIMPLEX
	ST, MU, MTRJ, E-2000	APC	DUPLEX
	MTO-MTP		QUAD

## KFAOC

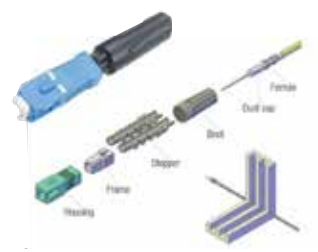


Fast connectors provide an immediate termination to either single-mode or multimode fibers. The connector are pre-polished in factory, catering for 250um to 900um, and 2.0mm, 3.0mm diameter single mode and multimode fiber types,

- Insert loss :  $\leq 0.3\text{dB}$
- Return loss :  $\geq 55\text{dB}$

Model no.	Item	Connector	Cable
KFAOC	Fast connector	SC/PC, SC/APC	0.25/0.9/2.0/3.0mm
		LC/PC, LC/APC	

## FDAC



- Only 4.5mm hole required
- Quick and easy assembly in the field
- High stable mating and de-mating characteristics
- Designed for variable cable
- Comply with : JIS C-5973, IEC, Bellcore

Model No.	Type	Connector	Cable
FDAC	Drop cable connector	SC/PC, SC/APC	3.0mm

## HEAT PROTECTION TUBE



Heat shrinkable sleeve is applied to the optical fiber closure to fix and protect the optical fiber when splicing.

- Rod : Ceramic / Steel

Item	Model No.	Type	Diameter of steel rod	Length	Color
Heat shrink sleeve	HTS-SM	Single	1.5 $\pm$ 0.05	40mm/60mm	Transparent, Optional
Heat shrink sleeve	HTS-RM	Ribbon	1.5 $\pm$ 0.05	40mm/60mm	

## TOOLS



The Smallest and the Lightest Active Alignment Fiber Fusion Splicer

- Full touch screen
- Active Alignment Splicer – 4 Motors
- Fastest Splicing Time  
7 sec with single mode fiber (quick mode)  
16 sec Heating time

Item	Model No.	Size	Weight	Battery Cycles
Fusion splicer	MINI-4S	122mm X 124mm X 138 mm	1.31kg	400



High Precision Fiber Cleaver is ideal for FTTx applications. The attached hexagonal wrench on the bottom allows you to adjust cleaver anytime and everywhere, enhancing the working efficiency greatly.

Item	Model No.	Cable	Cleaving length	Blade lifetime
Fiber cleaver	FS-01	125/250/900mm	9–16mm	36,000 times

## TOOLS BOX



Tool Box contains 13 kinds of tools in total. It consists of Microduct special tools and other durable tools which can be efficiently used in installation site. This portable tool box is an essential item for Microduct cutting, branching and termination.

Item	Size (W x L x H)	Application	Gross Weight
Tools box	460mm X 330mm X 120mm	Duct cutter and 12 different kinds of tools	6.5kg



## Outdoor Cabinet



Optical Distribution Cabinet(ODC) rack contains of structured cabling for Data, Voice and Video. It requires a small space, which makes it convenient for management and operation when the cables are connected, distributed, arranged or extended.

The ODC is specifically designed for the first sector of FTTx operating, it is normally placed at service provider's central office (CO).

Model no.	Dimension (mm) W x D x H	Cable Input Ports	Cable Output Ports	Unit	Material	IP grade
ODC-14U	845 x 600 x 684	3 (PG36)	16(PG16)	14U	EGI	55
ODC-22U	845 x 600 x 1,040	3 (PG36)	16(PG16)	22U		
ODC-28U	845 x 600 x 1,306	3 (PG36)	16(PG16)	28U		



Knet's Fiber Distribution Hub (FDH) PON Cabinet provides an interconnect environment from the feeder network through the optical passive splitter to the distribution network.

Designed for the outside plant environment, these cabinets provide a single distribution point to distribute FTTH in urban or dense neighborhoods.

Providing distribution scalability from 12 to 288 ports, network architecture can be maximized for both existing subscribers as well as future growth opportunities.

Model no.	Dimension (mm) W x D x H	Cable In/Out put Ports	No. of Adapter	No. of Splice	Material	IP grade
FDH	900 x 300 x 1,150	4 / 11(24way)	320	672	AL	55

## Manhole/Handhole



Plastic manhole has developed and perfected an innovative dough moulded formulation that combined with the most advanced molding techniques that guarantees consistent production and quality.

- DMC = Dough moulded Compound
- PP = Poly Propylene

Model no.	Dimension (mm) W x H	Weight (kg)	Main Material	Loading (kg)
K600HD	∅770 x 760	115	DMC, PP	4,000
K900HD	∅1070 x 1081	340	DMC, PP	13,500

**Eastern of Canada - Telecommunication Service Provider**



Broadband Network - Canadian Tier 1 service provider was using Knet microduct to provide high speed service to end subscribers. Drilling had been used as one of their major installation method.



**Metro Area- Micro trenching for FTTH, New York**



New York City specifies 7way ( 7 tubes). The infrastructure owner is using couple of tubes and the extra tubes are available for City agency or other providers later. The better solution needed for busy street with less disruption and ended up to chose micro trenching. Only one lane out of 3 were blocked for the job and the residents in neighbor gave the complimentary on how the construction goes so well without disturb.

**The international oil and gas company's digital technologies, USA**



To manage the stability of pipeline infrastructure is driving to adapt the digital technologies such as smart sensors, cloudy systems which makes real time data collect from oil field. Drilling optimization, detecting leakage faster and reducing repair response times are now possible to use telecommunication infrastructure. Using microduct , it is possible for energy company to deploy fiber optic cable easily along with their own energy ( gas or oil) pipe line



**Business Park New Development, Costa Rica**



The Business park was just 60mins away from the ports(Air/Sea) in Costa Rica. For building a new business complex, an optimized fiber pathway was a MUST. The developer had already installed a 4 inches duct with four 1.25 inch sub-ducts (OD 31mm). In order to maximize the capacity of cable, microduct solution was used.



**Smart City OSP infrastructure, Free Zone Colón, Panama**



Due to excessive amount of cables on the power line poles, the telecommunications regulator did not allow to install anymore aerial FO cables in the city. The service provider decided to investigate the option to go underground and the conclusion was to do mini trench and use microducts .



**Global Mining company – Fiber Optic cable installation, Brazil**



The fibers, which will serve the automation, telephone and internet systems of the new mine, are being installed by means of micro ducts. a rigid cable formed by small grouped ducts, through which the optical microfibers pass. The network can be both aerial and underground.



## Network Expansion in North Europe, Sweden & Finland



Telecommunication Service Providers has been building its network in North European regions, mainly for metropolitan area of Sweden and Finland. KNET's air blown solution has been applied since 2014 and thousands kilometers of Microducts were supplied to the local partner. Thick-walled Duct with easier operation advantage and proved resistance of low temperature makes the expansion more efficient. Up till now, the basic network of metropolis is almost fulfilled and some rural areas are being installed according to their increasing demand for fiber network connection.

## Fast and Flexible Distribution Network Expansion, Germany



The demand for subscribers connection has been increasing which causes network provider and ISP companies to expand network and FTTH coverage for better services with reasonable cost. Accordingly, Microduct and Air Blown Solutions have been adopted in order to save initial installation cost. Additionally, service providers need solutions for flexible distribution network depending on subscribers' request with minimal time and installation. For these purposes, small size of Microtube has been widely deployed for distribution network.

## Turksat Project in Golbasi, Turkey



Turksat project was the first project to implement the microduct technology in Golbasi, Turkey. After mini trenching ( 50mm Width & 400 mm Depth), the microduct (Microduct TWD 14/10mm 4way and 7/3.5mm 12way) was laid before cable installation. The installed distance of cable was 90 meter per min by air blowing. We had finished 1Km with less than 30 min and consequently we got Turkey KMO project.

## National Broadband Network, Greece



Almost fully occupied Manhole and the necessity of migration from copper cable to fiber optic cable stimulates the demand of applying Microduct Solution. Direct Buried Duct is deployed by Micro-trenching method and Direct Install Duct is installed into existing PVC ducting system.

## Fast Deployment for Mobile Tower connection : Myanmar



The new Myanmar mobile operators needed to build the backhaul connection in a very short period of time. The expansion of its coverage was essential to increase the market share in this emerging market. Network providers can manage their networks easily since the fiber/ cable was shared with individual inner tube compare to conventional case. It's suitable for mobile backhaul connection since Tower provider or Network Provider can easily set up cost effective infrastructure with expandable network. (By blowing empty tube when customer request service)

## Telecommunication Service Provider, Korea



Telecommunication companies such as KT and SKT and utility companies such as KEPCO are focusing on how to efficiently utilize existing infrastructure for network expansion. As a solution, we have installed DI Microduct in existing outer ducts and bundle ducts in existing subducts. It makes subscribers connection faster and time and cost saving for civil work comparing to the conventional installation method.

## Prevent risk of damage to existing underground utilities, Philippines



Since required fast deployment for 3rd Mobile Telco launching and avoiding high risk of causing damage to existing underground facilities, micro duct is the efficient solution to satisfy the customer's needs.

## MEA Common Ducting & Underground Migration, Thailand



In order to improve the aesthetic view of Bangkok, government own organization, Metropolitan Electricity Authority (MEA), raise 5 years project plan to bring down aerial cable and replace with underground Microduct total distance 500 km. KNET solution is to deploy a common ducting, Thick Walled Duct 4way 14/10mm + 4way 12/8mm inside existing underground MEA's PVC duct to accommodate fibers and serve to population in Bangkok city.

## SINGAPORE In Building Solution



The government subsidiary policy for non-residential buildings offered opportunity for KNET LSZH Microduct supply, which got UL Certificate to guarantee the function of flame-retardation. KNET, aiming at being a total solution provider, also developed customized Mounting Rack and Patch Panel for tube arrangement with bulkhead connector in MDF room



## The Municipality's Leading Open Access Network, Indonesia



The Bandung city mayor declared to stop the fiber optic infrastructure deployment since there were a lot of issues and sprawling network constructions from the several operators. Moreover, the municipality did not allow random excavation anymore, mainly due to severe traffic jam. Thus, the infrastructure needed to be shared by the operators and construction had to be done in a short time. Micro trenching was the best solution to minimize traffic disruption and the operator were able to use the extra tube from microduct bundled without additional excavation to comply with municipality's policy.



## Nationwide End-to-End Microduct Network, New Zealand



This project has been designed with the microduct from the backbone area to the drop. To complete the project, the owner of the project had to find the manufacturer who could supply the whole product portfolio. KNET was one of the very few suppliers having capabilities to satisfy the demands for providing the wide range of the configuration. Various types of customized Microducts to meet subscribers' environment have been suggested and deployed





### **KNET Global Network**

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### **Internationally Certified with KNET**

KNET has met and maintains the rigorous standards required to become a certified by ISO9001, ISO14001 and TL9000. KNET Microduct has been rigorously tested by Telcordia Technologies and found to be compliant with Telcordia GR-3155-CORE



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