

# FTTA ASSEMBLY GUIDE: **SOLUTIONS** FOR DAS AND CELLULAR APPLICATIONS



**C-ENTERPRISES**  
*Connecting Today's Infrastructures*

---

## Introduction

The demand for Wireless Infrastructure is growing exponentially. It is critical for contractors, service providers and enterprise networks to meet that need. C Enterprises delivers on our promise to provide assemblies and components manufactured to the highest Industry and Carrier standards. Our lineup is backed by personalized customer service and quick-turn capabilities, insuring a fast response time and a prompt delivery.

We invite you to review the following selection of top-selling Fiber-to-the-Antenna (FTTA), Hybrid-to-the-Antenna (HTTA), Distributed Antenna Systems (DAS), and Low PIM RF Solutions.

Simply place an order with our C-Flash services or a Dedicated Account Manager, and let our cutting-edge Corning Connections Gold certified manufacturing facility do the rest.



Table of Contents

Commonly Selected Fiber Assemblies.....4

Connector Selection.....5

Breakouts.....6

Other Components.....7

Low PIM Coax Cable Assemblies.....8

Multifiber Assemblies.....10

MicroArmor™ Fiber Assemblies.....12

Below is a selection of FTTA and DAS assemblies offered as part of our lineup. Many of our assemblies are compatible with hardware manufacturers such as Huawei and Ericsson. Additionally, we employ the highest quality Industry and Carrier rated components to provide an unmatched level of customer satisfaction.

### Commonly Selected Fiber Assemblies



Wireless installations can vary from site to site. Select from the commonly used components below and reach out to our expert staff for your Wireless Solution.

## Fiber Connector Selection

### IP-Plus® Series

IP-68 rated, UV-resistant, ODVA-style connectors provide a secure connection in harsh environments requiring water and dust ingress protection. Available in LC, MPO and SC connector varieties.

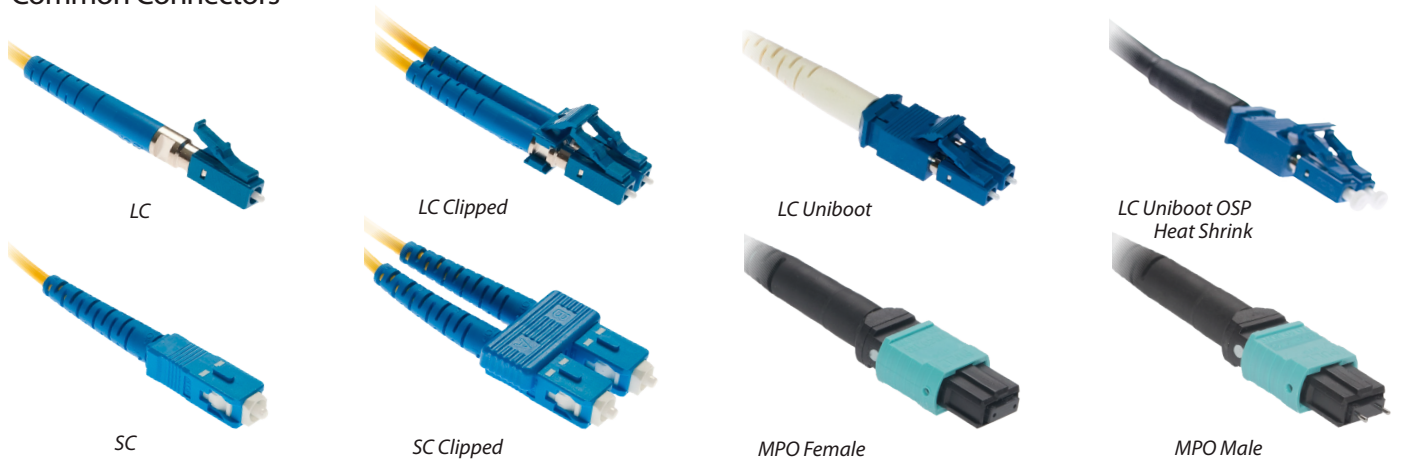


### IP-ONE® Power + Data

Wireless applications such as Cell Tower and DAS require a secure connection for both data and power. The IP-ONE connector series provides a unique solution to fit this need. The ODVA style uses an innovative interface for connecting Optical and Power requirements.



## Common Connectors



## IP-Rated Adapters

A full lineup of Adapters is available for our ODVA-style IP rated connectors. The Bulkhead adapter allows for easy installation of IP-rated assemblies into a wide range of hardware. Our In-Line Adapter Series allows for easy cable assembly extension, providing the flexibility to fulfill updated cell tower requirements and the need for infrastructure growth.





## Breakouts

### C-Break

Our production staff manufactures breakouts to meet environmental and customer requirements. Ruggedized construction and optional OSP-rated materials provide increased protection for harsh conditions.



### IP-MPO Extension

The IP-rated Fan Out housing easily connects an IP-MPO feeder trunk assembly to a factory terminated breakout of IP-Series connectors. The Plug and Play design maximizes configuration flexibility without complicating installation.

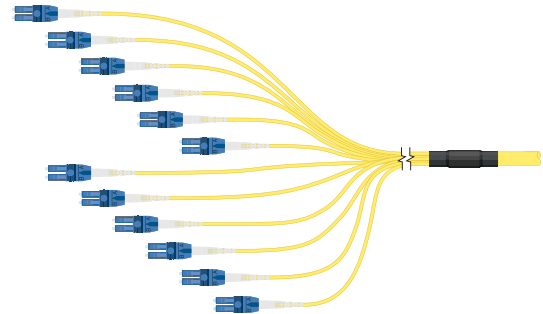
### IP-Fan Out Kits

IP-Fan Out Kits provide a robust alternative to using junction boxes. These kits are ideal for large scale installations as they require minimal installation activity on the antenna. The fan out units are both weather and dust proof, ensuring a long-term reliable junction.



## Staggers

Assemblies connecting to Remote Radio Units often rely on carrier/installer specified staggering patterns to ensure best usage of antenna space, allowing for future growth.



### Pulling Eyes / Spools

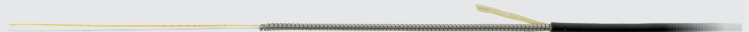
Assemblies can be offered spooled and with pulling eyes to ease installation in wireless environments. Our sturdy pulling eye design secures connectors and breakouts during the installation, such as when running an assembly up an antenna.

## Cable

Select from OSP and Indoor/Outdoor cables that will withstand the rigors of the wireless environment and meet applicable carrier/hardware standards. Below are some of the durable cable designs we employ to ensure a constant, secure connection for your assemblies.

### MicroArmor Fiber™ Cables

The patented stainless-steel tube design greatly reduces cable diameter and weight compared to other types of armored cables. Tubing provides excellent rodent protection and crush resistance. Available with armored subunits.



### Aluminum Interlocking Armored (AIA) Cables

Standard jacketed cables are housed inside interlocking aluminum for crush resistance and ruggedness. Design eliminates the need for installing conduits.



### Corrugated Armored Cable

This commonly used armored cable design provides crush resistance and rodent protection. Design is appropriate for direct burial applications.



## Antenna – Low PIM Coax Cable Assemblies

### Custom Coax Wireless Assemblies

Our custom coaxial interconnect solutions are designed to meet the rapidly increasing demand for wireless communication infrastructure. Assemblies provide a reliable connection for your antenna hardware, even under harsh outdoor conditions. We offer connector and cable options compatible with large scale equipment manufacturers.

*Built to meet the rigors of your system's requirements.  
All products proudly assembled and tested in the USA.*

Let our knowledgeable staff assist in selecting a solution for you.

#### Cell Tower

Assemblies are engineered to provide a high-performance connection between Remote Radio Units (RRU) and antennas. With the proliferation of high-speed technology such as LTE™, the importance of limiting Passive Intermodulation (PIM) becomes a critical part of meeting carrier application requirements. Our wireless coax assembly series delivers consistent and superior performance with low attenuation and intermodulation, and high Radio Frequency (RF) shielding.

#### DAS

Distributed Antenna Systems (DAS) provide reliable wireless services in public spaces and buildings.

Passive and Hybrid DAS installations depend on coax cable assemblies to provide a high-performance connection to the antenna.

C-Enterprises' low loss, low PIM cables are available in various cable structures, from semi-rigid to super flexible, to meet bend radius requirements. The selection of outdoor, indoor/outdoor and UL910 plenum-rated cable jackets fulfill DAS application needs.

Ideally suited for DAS systems required by NFPA 72, IFC 510.1 Appendix J, and as may be required by state and municipal fire codes for public safety.

### Available Options

Connector Types:	<ul style="list-style-type: none"> <li>• 7/16 DIN</li> <li>• N</li> <li>• 4.1-9.5 Mini DIN</li> <li>• 4.3-10</li> </ul>	<ul style="list-style-type: none"> <li>• QMA</li> <li>• SMA</li> <li>• TNC</li> <li>• and more</li> </ul>
Cable Jacket Rating:	<ul style="list-style-type: none"> <li>• Outdoor</li> <li>• Indoor/Outdoor</li> </ul>	<ul style="list-style-type: none"> <li>• Plenum</li> </ul>
Cable Design:	<ul style="list-style-type: none"> <li>• Semi-Rigid</li> <li>• Flexible</li> </ul>	<ul style="list-style-type: none"> <li>• Flexible Corrugated</li> <li>• Super Flexible Corrugated</li> </ul>

### Applications

For use in wireless network systems that require high performance coax interconnect solutions with environmentally-rated ruggedized materials:

- DAS I Small Cell I PICO Cell
- Outdoor DAS networks in campus, stadium, and other wireless settings.



### Testing Limits

All assemblies are tested electrically for continuity wire mapping and shorts. Low PIM cable assemblies include 100% passive intermodulation testing in accordance with IEC 62037 standards. Additionally, our Quality Assurance and Inspection system is in accordance with ISO-9001 guidelines.

*Low PIM assembly test results are available upon request.*

### Agency / Standard Compliance

#### Coax Assembly:

- ISO 9001:2008 Certified
- RoHS Compliant
- Conflict Minerals Compliant
- Assembled to the requirements of IPC/EIA J-STD-001
- Assembled to the requirements of IPC/WHMA-A-620
- Verizon Wireless® approved cables available

### Customization

Requirements for wireless systems will vary. Reach out to our sales team to learn about additional components and solutions offered to fit your wireless needs.

### Durability

Assemblies for the cell tower environment can be employed in both rigorous outdoor conditions, as well as for indoor routing. Outdoor and indoor/outdoor assemblies supplied with UV resistant cable jackets.





### Indoor/Outdoor and Outdoor Assemblies

Cell tower and oDAS equipment employs coax assemblies employ coax assemblies built with an properly environmentally rated low PIM cable. Ideal for jumper assemblies in wireless communication systems, and for short antenna feeder runs. Offering either corrugated braided shielding, these assemblies will withstand the rigors of an outdoor environment without sacrificing performance.



### Plenum Rated Flexible Assemblies

DAS installations depend on coax assemblies which meet both the performance and design requirements of the desired application. Assemblies are tested according to strict low loss, low PIM parameters. In addition, the plenum rated cable jacket meets building fire codes and employs a flexible cable design, which allows for easy routing into tight mechanical spaces.



### RET Cable Assemblies

Used to feed data and power to crucial Remote Electrical Tilt (RET) system components in an antenna environment. The shielded, IP67 rated assembly is Antenna Interface Standards Group (AISG) compliant, and also intermatable with major equipment manufacturers such as: Andrew, Kathrein and Huawei.



### Adapters

With the need to connect new technology to existing infrastructure, Low PIM adapters, made of high quality materials, ensure interconnectivity between various styles of connectors. Each adapter is designed to reduce PIM and offers excellent return loss and power handling performance. Silver or white bronze plating provides corrosion protection and abrasion resistance, while providing superior electrical contact properties.



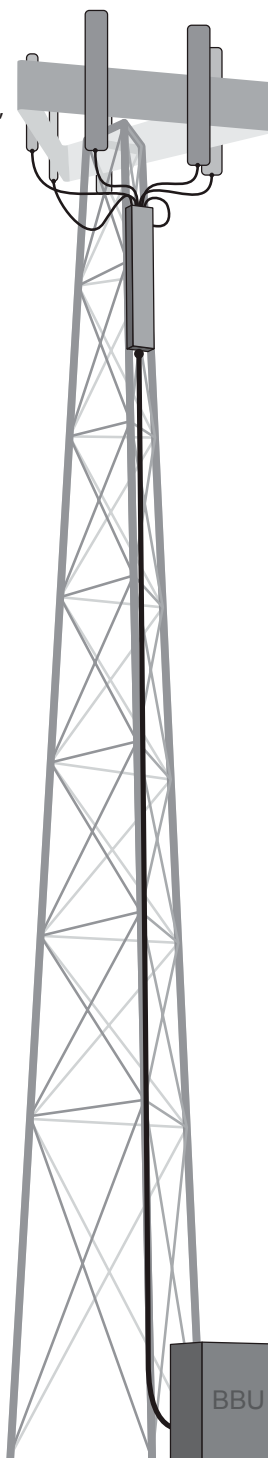
### Low PIM Splitters

In order to meet different antenna output specifications, cell tower and DAS systems rely on power splitters to divide the signal for multiple antennas. The high-quality design ensures that there is superior performance without any degradation.



### Low PIM Couplers

Hybrid couplers combine two wireless carriers into a single antenna feed or a distribution cable while maintaining superior performance.



Contact the C Enterprises Sales Team for your wireless solutions.

Each manufacturer uses their own connection style, and this can vary even between various generations of units from the same manufacturer. Let us simplify the process.

## Antenna Application – Multifiber Assemblies

### Custom Fiber Indoor/Outdoor Assemblies

Our custom-built fiber assemblies are designed to meet the rapidly increasing demand for wireless communication. Suitable for use in wireless applications such as: Fiber to the Antenna (FTTA), Fiber to the Cell Site (FTTCS), and Distributed Antenna Systems (DAS). We employ a wide range of components that will ensure compatibility with large scale equipment manufacturers. Let our knowledgeable staff assist in selecting a solution for you.

Built to meet the rigors of your system's requirements.

### Features

#### FTTA / FTTCS

Assemblies are engineered for connecting Remote Radio Units (RRUs) and the Base Band Unit (BBU) in a wide range of antenna designs.

#### DAS

A key part of DAS antennas providing reliable wireless services in public spaces and buildings.

Ideally suited for DAS systems that are required by NFPA 72, IFC 510.1 Appendix J, and may be required by state and municipal fire codes for public safety.

#### Superior Design

Assembly built with OSP furcated breakouts and uses an impact resistant breakout knuckle design.

Designed to be used where outdoor rated connectivity is required.

Assembled in the USA.

### Available Options

#### Connector Types:

Duplex LC, LC Uniboot\*, MTP®/MPO, SC, FullAXS™ compatible cable glands, IP-Series Outdoor Connectors

- \* Design allows for reconfigurable polarity.
- \* Mounted directly onto the cable.
- \* Adhesive Heat Shrink applied to seal cable to connectors.
- \* Connector Polish: UPC, APC, PC.

### Applications

For use in fiber optic network environments that require indoor/outdoor rated ruggedized materials:

- FTTA
- FTTCS
- DAS networks

### Durability

Indoor/Outdoor assemblies designed for both rigorous outdoor conditions and indoor routing.

Cable outer jacket UV resistant.

Water blocking aramid yarn strength members.

Connectors exceed industry standards for mechanical performance, optical performance, and reliability.

Selected connector designs meet IP waterproof rating standards.

### Testing Limits

All assemblies tested to appropriate industry standards.



Example of an Indoor/Outdoor Duplex Assembly with applicable information below.

### Parameter

Operating Temperature

Cable Outside Diameter:

Cable Bend Radius

Cable Jacket Color:

Cable Retention:

### Specification

- 40°C to + 70°C

(- 40°F to + 158°F)

4.4 mm (0.17 in)

4.4 mm (0.17 in) Operation

6.6 mm (0.26 in) Installation

Black

less than 6.8 kg (15 lbs)

### Agency / Standard Compliance

#### Cable:

- RoHS/REACH Compliant
- ANSI/TIA 568
- ITU-T G.657.A1
- UL Listed:
- OFNP- NFPA262 Flame Rating
- OFNR- UL1666 Flame Rating

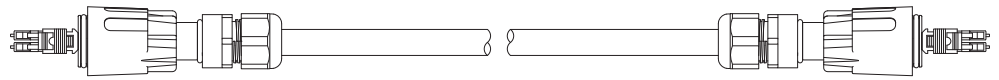
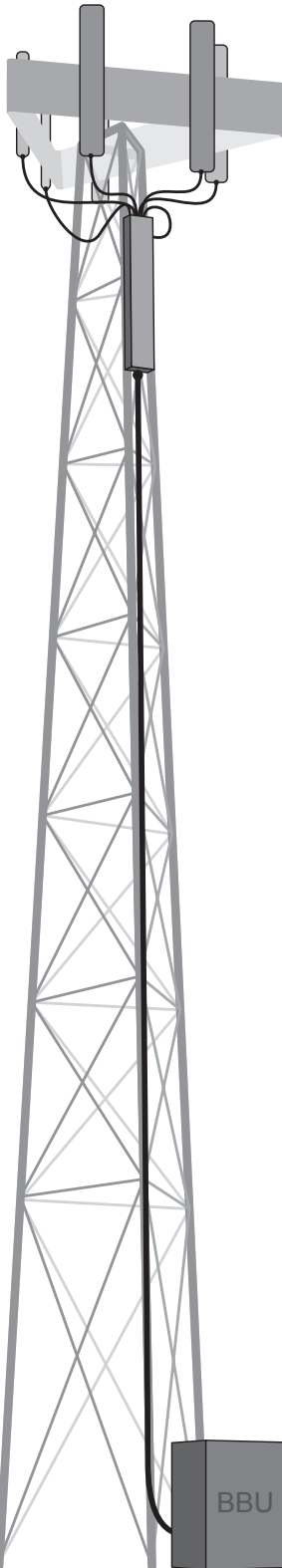
#### Connector:

- RoHS/REACH Compliant
- ANSI/TIA 568
- TIA 604
- Telcordia GR-326

### Customization

Requirements for wireless systems will vary. Reach out to our sales team to learn about additional components offered to fit your wireless needs.

For full line-up see the next three pages



### Armored Duplex Indoor/Outdoor Assembly

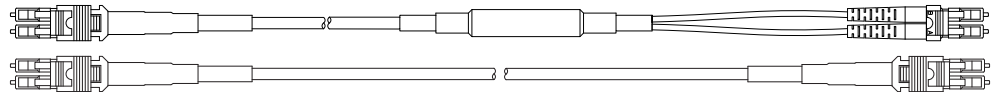
Assembly provides protection from harsh weather conditions as well as small animals. The cable is Indoor/Outdoor rated with water blocking elements to provide protection from the environment. Designed with interlocking armor and employing a rodent-detering agent in the outer jacket, the cable provides protection from rough handling and against rodent biting. Assembly depicted with duplex LC connectors in FullAXS™ compatible cable glands.

#### Agency / Standard Compliance

- ANSI/TIA 568
- RoHS/REACH Compliant
- Core cable tested to Verizon TPR 9424, Issue 2
- ETL Listed Type OFCR
- Meets Telcordia GR-20

#### Parameters

- Operating Temp: -40°C to + 70°C (-40°F to +158°F)
- Cable Diameter: 13.3 mm (0.52 inches)
- Corning SMF-28 Bend Insensitive Fiber



### Duplex Indoor/Outdoor Assembly

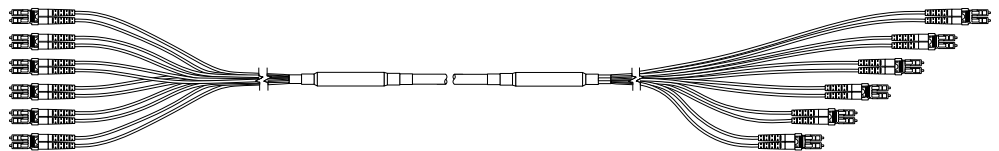
This assembly provides a connection between the BBU and the RRU. This can be a direct from the BBU to the RRU, or from a junction box to the RRU. Cables used are rated for the rigorous outdoor conditions of antenna systems. Solutions are available to accommodate the manufacturers of various antenna systems.

#### Connectors Available

- LC Clipped
- FullAXS™ Compatible Cable Glands
- IP-Series Connectors (ODVA)
- LC Uniboot with Heat Shrink
- and more

#### Breakout

- Furcated Tubing
- OSP Furcated Tubing



### Multifiber Indoor/Outdoor Assembly

When a junction box is used, this trunk assembly provides an effective way to connect the BBU to a greater number of RRUs on the antenna. Junction boxes available will clamp either directly on to the cable, sealing and protecting the connection, or require the use of IP-Series connectors. Connectors and breakouts offered address the variety of junction box designs.

#### Connectors Available

- LC Clipped
- LC Uniboot
- MTP®/MPO
- SC Clipped

#### Breakout

- Furcated Tubing
- OSP Furcated Tubing
- Staggered Connectors
- Pulling Eyes



## FTTA Application - MicroArmor Fiber Assemblies

### Custom Fiber Armored Assemblies

Our leading edge Micro Armor Fiber™ Assemblies employ a unique ruggedized cable design with unmatched sizing and flexibility. A large selection of armored cables and custom assembly options are a part of C Enterprises' high quality quick-turn solutions.

*Built to meet the rigors of your system's requirements.*

### Features

Micro Armor Fiber™ Assemblies, built using Tinifiber®, utilize a patented stainless-steel tube design which reduces cable diameter up to 65% and cable weight up to 75% as compared with typical Aluminum Interlocking Armor (AIA).

Reduced cable diameter and weight allows for easier routing in tight spaces, as well as improved air flow and rack ventilation.

Cables jackets meet industry requirements for the wide range of applications employing armored and/or ruggedized cable assemblies. Smaller form factor design provides cost savings associated with shipping and installation.

Assembled in the USA.



- Diameter reduced up to 65%
- Weight reduced up to 75 %

### Available Options

Built to accommodate your connectivity needs with the following options:

- Cable Mode: Single-Mode (OS2), Multimode (OM1, OM2, OM3, OM4)
- Fiber Count: 1-144 fibers
- Fiber Type: 900 um (Buffered Fiber), 600 um (Buffered Fiber), 250 um (Loose Tube, Subunitized, Ribbon)
- Cable Jacket Rating: Riser, Plenum, LSZH, Indoor/Outdoor, OSP

### Applications

Wide range of applications include: DAS, LAN, WAN, SAN, Broadcast, CCTV, Aerial, Direct Burial, and FTTx.

### Durability

Specialized cables designed to meet application and environment requirements.

Stainless-steel coiled tubing surrounded in Kevlar® provides excellent tensile strength, rodent protection, and crush resistance.

Available with steel braiding and water-blocking yarn.

Cable suitable for tight bend environments.

Connectors exceed industry standards for mechanical performance, optical performance, and reliability.

### Agency / Standard Compliance

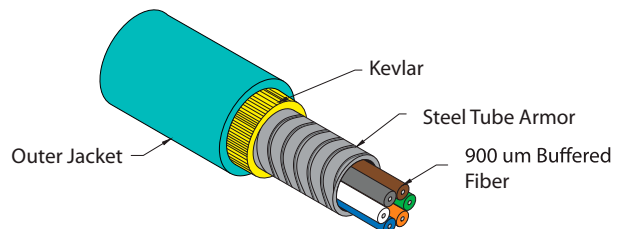
#### Cable:

- RoHS Compliant
- UL Rated
- NEC Jacket Ratings
- ANSI/ICEA S-87-640
- Corning Optical Fiber



Depiction of a 6 Fiber OM4 Armored Plenum Cable with applicable information below:

Parameter	Specification	
	Micro Armor	AIA Armor
Outside Diameter:	6.0 mm	11.3 mm
	(0.24 in)	(0.44 in)
Bend Radius Installation	120 mm	170 mm
	(4.42 in)	(6.7 in)
Bend Radius Operation	60 mm	113 mm
	(2.36 in)	(4.5 in)
Weight per km	55 kg	103 kg
	(121 lbs)	(227 lbs)
Tensile Strength Installation	800 N	440 N
	(180 lbf)	(100 lbf)
Tensile Strength Operation	600 N	132 N
	(135 lbf)	(30 lbf)



## QUESTIONS?



Contact one of our experts for your wireless assembly questions.



2445 Cades Way Vista, CA 92081



[www.centerprises.com](http://www.centerprises.com)



[info@centerprises.com](mailto:info@centerprises.com)



Toll Free: 800.334.3815



Office: 760.599.5111