Seamless 5G In-building Wireless Coverage provided by SOLiD and RF Industries

Reliable in-building wireless connectivity is a "must-have" service for employees, customers, and visitors. An estimated 80 percent of all cellular traffic occurs inside buildings. Unfortunately, 74 percent of employees experience poor cellular reception. Service providers, such as AT&T, T-Mobile, and Verizon, operate macro networks that transmit cellular signals from outdoor antennas. Building structures can cause interference by blocking or diminishing the signal resulting in dropped calls, capacity limitations, and spotty indoor coverage. The problems are even worse deep inside the building or in elevators, stairwells, and parking garages.

To solve the connectivity issues, building owners install Distributed Antenna Systems (DAS) that extend the outdoor cellular coverage into their facilities. A properly designed and implemented DAS connects to the cellular network and distributes the signals via a remote antenna system to every corner of the building or campus environment providing secure and reliable coverage.

SOLiD has more than 20 years of DAS innovation and successful deployments in major corporations, transportation hubs, and stadiums. The ALLIANCE 5G DAS provides seamless, high-speed cellular communications from the top floor to the underground parking garage. It is a multi-operator solution that supports all the sub-6GHz frequency bands. The modular, scalable solution is easy to install and has low maintenance costs.

RF Industries – RF Connectors and RF Cable Assembly, Microlab, Cables Unlimited, and C Enterprises – designs and manufactures a broad range of interconnect products across diversified, growing markets, including wireless/wireline telecom, data communications, and industrial. The company's products include RF coaxial cable assemblies, data cables, wire harnesses, fiber optic cable assemblies, custom cabling, energy-efficient cooling systems, and integrated small cell enclosures.
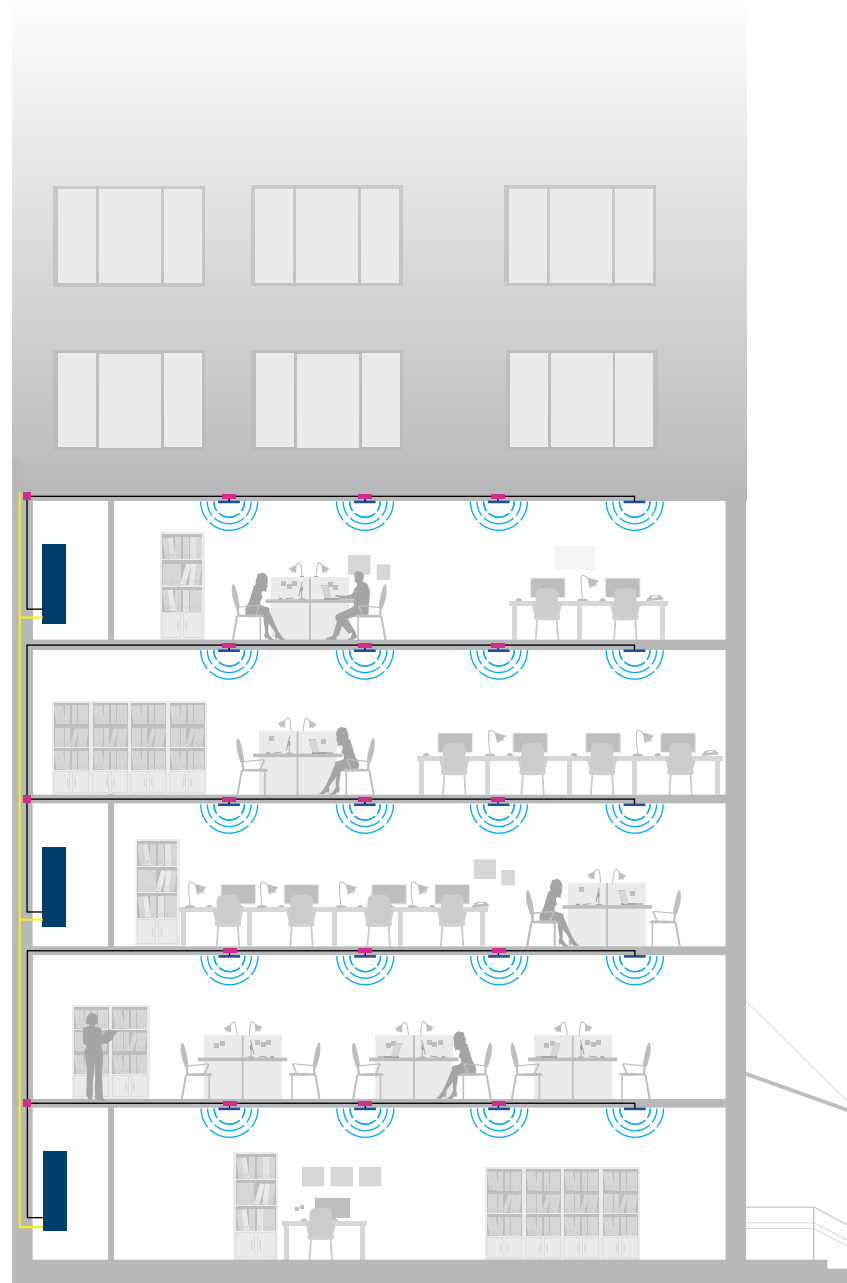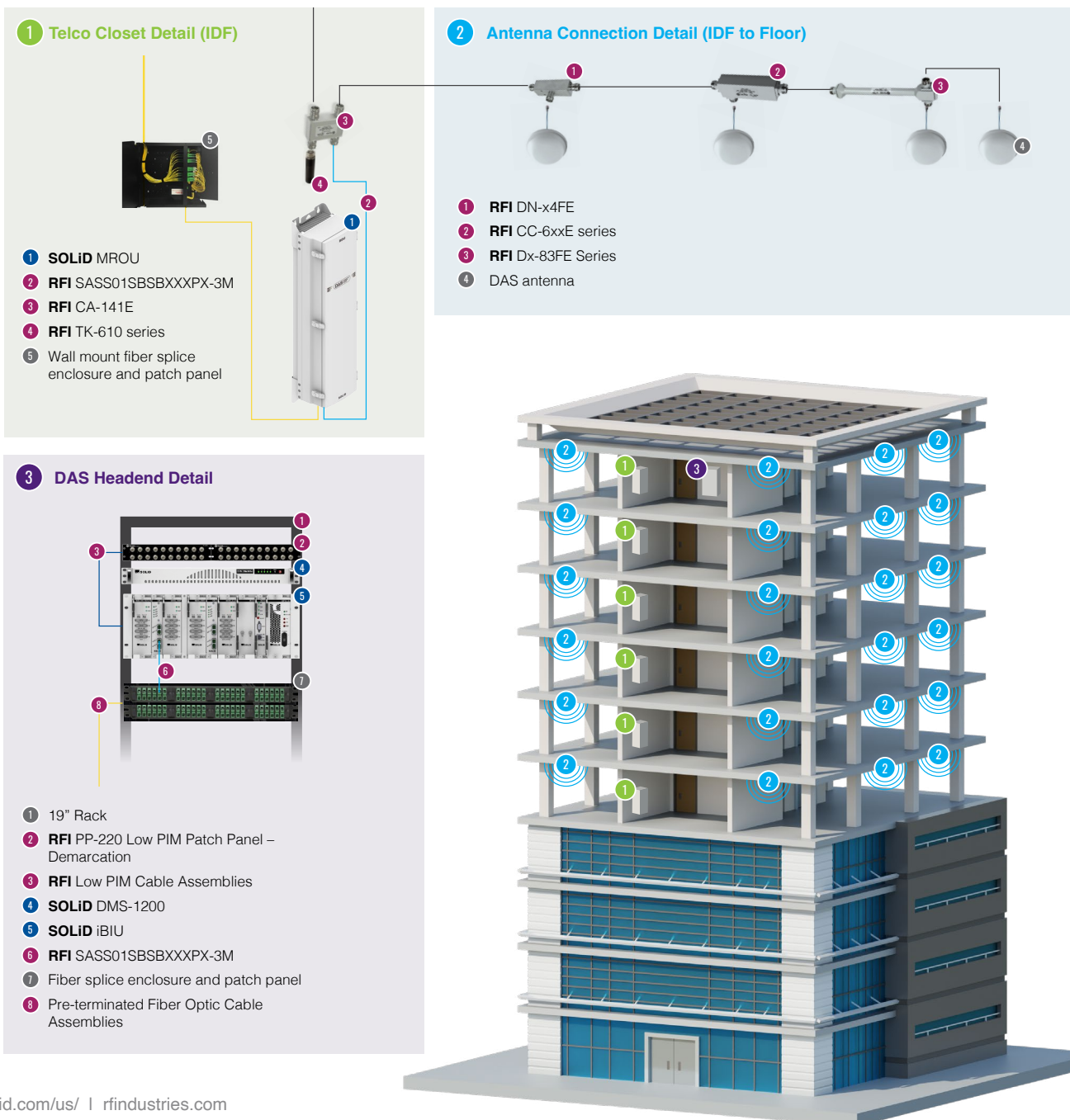
Faster Speeds

More Capacity

Multi-Operator Support

High-performance, Passive DAS Infrastructure

SOLiD and RF Industries teamed to form a complete end-to-end passive DAS. The solution combines SOLiD's industry-leading 5G ALLIANCE portfolio of products with RF Industries' broad array of RF connectors and passive components as well as coaxial cables and fiber optic cable assemblies.

Together, SOLiD and RF Industries provide expanded 5G in-building coverage, faster data speeds, more bandwidth, increased security, and the ability to support a higher density of mobile devices and connections. 5G is driving the development of a wide range of new use cases for the vertical markets and will be instrumental in influencing how businesses operate. Commercial real estate buildings, health care facilities, university campuses, sports arenas, and transportation hubs rely on DAS to provide seamless, high-speed cellular communications.

1 Telco Closet Detail (IDF)

1. **SOLiD** MROU
2. **RFI** SASS01SBSBXXXPX-3M
3. **RFI** CA-141E
4. **RFI** TK-610 series
5. Wall mount fiber splice enclosure and patch panel

2 Antenna Connection Detail (IDF to Floor)

1. **RFI** DN-x4FE
2. **RFI** CC-6xxE series
3. **RFI** Dx-83FE Series
4. DAS antenna

3 DAS Headend Detail

1. 19" Rack
2. **RFI** PP-220 Low PIM Patch Panel – Demarcation
3. **RFI** Low PIM Cable Assemblies
4. **SOLiD** DMS-1200
5. **SOLiD** iBIU
6. **RFI** SASS01SBSBXXXPX-3M
7. Fiber splice enclosure and patch panel
8. Pre-terminated Fiber Optic Cable Assemblies

SOLiD

The SOLiD ALLIANCE 5G platform is a multi-operator, neutral host DAS system which provides highly efficient active and passive in-building wireless solutions. Our FIBER2ANTENNA and FIBER2COAX solutions support frequencies ranging from 150 MHz to 6 GHz.

FIBER2ANTENNA

SOLiD's FIBER2ANTENNA ALLIANCE 5G DAS platform is a fiber-to-the-edge active DAS remote. The edgeROU is the smallest, most attractive, highest power, and lowest cost active DAS remote available! The latest model of edgeROU supports the fully occupied 280 MHz of the C-Band with 2×2 MIMO!

ALLIANCE edgeROU

Features and Benefits:

- Installs on the ceiling and has a low profile with only 1.5" exposed
- Available with integrated antennas or external antenna ports
- Provides the entire bandwidth of up to four frequency bands with up to 24 dBm per band before the antennas
- Main and add-on configurations support up to eight bands over a single fiber strand
- Uses the same headend equipment (iBIU) as all other ALLIANCE DAS remotes
- edgeHUB (located in IDF closets) provides a fiber MUX capability to conserve fiber between the headend and edgeROUs
- edgeHUB provides power for sixteen edgeROUs

FIBER2COAX

ALLIANCE 5G DAS is SOLiD's multi-operator, neutral host platform. Traditional hybrid fiber and coaxial DAS remotes are available in 2W, 5W, 20W, and 40W power classes supporting all bands from 150 MHz to 6 GHz.

Remote units receive signals from the headend over fiber optic cables and deliver multiband, multi-operator signals to antennas over coaxial cables. ALLIANCE's modular architecture provides day-one savings and future readiness. Bands can be added as needed.

Remote Optic Unit (ROU)

SOLiD's ALLIANCE multi-operator DAS has a portfolio of remote optic units (ROU) that range from 2 watts to 40 watts of output power. The enclosures are rugged, compact NEMA 4 or 4X designs and can be wall or rack mounted for indoor or outdoor environments. All the ALLIANCE remotes use the iBIU headend providing maximum design flexibility.

ALLIANCE N2ROU

Features and Benefits:

- 2W of power per frequency band
- 4 to 7 frequency bands in one remote
- Add-on Remote (AOR) provides up to 2 additional frequency bands for future-readiness
- Up to 9 frequency bands on one fiber strand

ALLIANCE MROU

Features and Benefits:

- 5W of power per frequency band
- 1 to 7 frequency bands in one remote
- Add-on Remote (AOR) provides up to 2 additional frequency bands for future-readiness
- Up to 9 frequency bands on one fiber strand
- Available with one or two antenna ports

ALLIANCE HROU

Features and Benefits:

- 20W and 40W options for power per frequency band
- 1 to 4 frequency bands per cabinet
- The main cabinet, HROU, is fiber-fed from the headend
- Expansion cabinet, HARU, has coaxial connections to HROU
- Up to 8 frequency bands on one fiber strand
- Available with one, two, or four antenna ports

ALLIANCE Mid-Band HROU

Features and Benefits:

- Supports C-Band (3.7 to 3.98 GHz) and Auction 110 (3.45 to 3.55 GHz)
- Up to 4 amplifiers supporting SISO or MIMO over a single fiber
- 32W output power for C-Band and 20W output for Auction 110
- Fully occupied bandwidth in every band
- Available with one or two antenna ports

ALLIANCE MPROU

Features and Benefits:

- 5W, 10W, and 20W power per frequency band
- 1 to 7 frequency bands per cabinet on one fiber strand
- Supports all commercial bands from 600 to 2700 MHz
- Multiband combiner provides one antenna port
- External fan cooled

ALLIANCE iBIU – Headend

The integrated base station interface unit (iBIU) is the headend that receives the cellular signals provided by multiple service providers (carrier networks.) Each signal is combined into an optical signal and transmitted over fiber optic cables throughout the building or campus environment. The signal input is independently filtered, attenuated, and controlled. The N2ROU, MROU, HROU, mid-band HROU, and MPROU connect directly to the iBIU.

Features and Benefits:

- Integrates all headend features in a compact 4RU chassis
- Fully modular to protect your investment
- Up to sixteen RF service connections per chassis
- Secondary chassis option available for additional services
- RF conditioning Points of Interface (POI)
- Two optical modules support up to 8 remotes
- Optical expansion to additional remotes via iODU & iOEU

DMS 1200 – DAS Management System

SOLiD's DMS-1200 provides comprehensive DAS management. It gathers vital system information and alarm data from the DAS network and transmits it to the customer's Network Operations Center (NOC) for monitoring. The DMS-1200 improves customer satisfaction by minimizing downtime and ensuring the SOLiD system remains reliable. It continuously performs comprehensive system health checks and reports status changes and alarm detections in real-time.

Features and Benefits:

- Real-time alarm monitoring and control
- Centralized management of the DAS network
- Web-based management
- Configurable SNMP traps
- Alarm control hysteresis, alert level, troubleshooting, masking
- E-mail notification
- Automatic and manual backup and restore

RF Passives – Combining and Distribution

Microlab products are known worldwide for their superior performance and are considered the gold standard in RF and microwave distribution systems. Microlab, LLC, founded in 1949, designs and manufactures high-performance components such as splitters, directional couplers, and hybrid and multiband combiners.

With over 70 years of experience, they have developed an extraordinary reputation for delivering quality products with unsurpassed reliability and immediate availability. Their products utilize the latest technologies, advanced systems, and unique manufacturing techniques. Microlab is dedicated to creating a valued product and respected name.

Accessory

The low PIM patch panel is designed to establish a demarcation point between a distributed antenna system (DAS) and base station equipment. This assembly provides an aesthetic means of integrating a DAS deployment.

Part Numbers	Description
PP-220FE	Patch Panel 20-port DC-6GHz 100W -165dBc 4.3-10 indoor

Attenuator

The AT series are coaxial attenuators for wireless applications in the wide DC to 6 GHz frequency range having low VSWR.

Part Numbers	Description
AT-xxE series	UWB Resistive Attenuator DC-6GHz 2W 4.3-10 Indoor. Available in 1dB step sizes 1-15dB, 20dB, & 30dB. xx=dB value *AT-10E (10dB attenuator)*

DC Block - Surge

DC block prevents the flow of direct current and low-frequency current surges along the inner conductor of a coaxial cable while permitting the unimpeded flow of RF signals. Applications include blocking current surges in subway tunnels and antenna sites during lightning storms.

Part Numbers	Description
HR-26E	UWB Inner DC Block 250-6000MHz 500W/3kV -161dBc 4.3-10 IP65
HR-29E	UWB Inner-Outer DC Block 250-6000MHz 500W/3kV -161dBc 4.3-10 IP67

Hybrid Couplers and Multiband Combiners

Microlab offers a wide range of hybrid and multiband combiners designed to meet the rigorous demands of the wireless market. They combine up to four wireless carriers in the operating band to single or multiple antenna feeds or distribution cables.

Part Numbers	Description
CC-6xxE series	UWB Directional Coupler 617-5925MHz 300W -161dBc 4.3-10 IP67, available in 5,6,7,8,10,13,15,20dB, xx=coupling value *CC-605E (5dB directional coupler)*
CA-141E	UWB Hybrid Coupler 2x2 617-5925MHz 100W -161dBc 4.3-10 IP67
CA-14E	UWB Hybrid Coupler 2x2 350-5925MHz 200W -161dBc 4.3-10 IP67
CM-141E	UWB Hybrid Combiner 4x4 617-5925 MHz 100W -161dBc 4.3-10 IP67
CM-14E	UWB Hybrid Combiner 4x4 350-5925MHz 200W -160dBc 4.3-10 IP67
BK-263E	Diplexer 617-2690/3300-5925MHz 200/100W -161dBc 4.3-10 IP67, available in single, twin, and quad
BK-3008E	Triplexer 617-960/1695-2690/3400-4200MHz 250W -161dBc 4.3-10 IP67, available in single and twin

Power Splitters

Reactive power splitters evenly split high-power cellular signals with minimal reflections or loss. Wilkinson power splitters are designed for 5G-NR signal distribution where output isolation is referable with minimal insertion loss.

Part Numbers	Description
D2-76FE	UWB 2-way Wilkinson Splitter 617-5925MHz 50W -153dBc 4.3-10 IP67
Dx-83FE Series	UWB Reactive Splitter 617-5925MHz 300W -161dBc 4.3-10 IP67, available in 2, 3, and 4-way. x=split value *D3-83FE (3-way splitter)*

Tapper

The DN-x4FE series of tappers unevenly splits high-power cellular signals in fixed ratios from 1000:1 to 2:1. The signals have minimal reflections or loss over the key wireless bands in the range 350 - 5,930 MHz (there is no coupling 1550 to 1650 MHz).

Part Numbers	Description
DN-x4FE	UWB Tapper 350-5930MHz 500W -161dBc 4.3-10 IP67, x=tapper config (see datasheet) *DN-54FE (6dB tapper)*

Termination

Microlab offers two types of terminations – low PIM and resistive. The TK-600 series of cable loads are ultra-wideband designs where extremely low passive inter-modulation is required. The TA series termination is low power coaxial loads that operate from DC up to 6 GHz depending on the model.

Part Numbers	Description
TA-2MHE	UWB Resistive Termination DC-6GHz 2W 4.3-10(m) IP65
TA-2MT	UWB Resistive Termination DC-6GHz 2W NEX10(m) IP67
TK-605 series	UWB Low PIM Termination 350-5925MHz 5W -161dBc IP67. available in 4.3-10 or NEX10 (see datasheet)
TK-610 series	UWB Low PIM Termination 350-5925MHz 10W -161dBc IP67. available in 4.3-10 or NEX10 (see datasheet)
TK-625 series	UWB Low PIM Termination 350-5925MHz 25W -161dBc IP67. available in 4.3-10 or NEX10 (see datasheet)

RF Connectors – Coax Assemblies

The RF Connector and Cable Assembly Division designs and manufactures a wide variety of RF coaxial connectors, assembly tools, adapters, kits, cable assemblies, and associated passive components. Over 1,500 connectors are available for field or factory attachment to hundreds of cable types. RF coaxial cable assemblies are fabricated with a wide variety of cables terminated with the companies' connectors or customer-specified brands of connectors.

Low PIM Cable Assemblies

Low PIM cable assemblies are manufactured using RF Industries and other brands' connectors. Jumpers are assembled in the United States from a wide variety of in-stock connectors and cables to meet system requirements for flexibility, low loss, low PIM, indoor/outdoor, fire rating, and electric performance.

RF cable assemblies can be ordered in any length to within 1-inch increments. Use the base part number followed by the length in inches.

Example:

P2RFC-2269-24: 2ft (24") ¼" SPP250, 4.3/10M-4.3/10M

Part Numbers	Description
P2RFC-2269-39	1m ¼" SPP250 Cable DC-6GHz, -160dBc, Plenum, 4.3/10M-4.3/10M
P2RFC-2269-79	2m ¼" SPP250 Cable DC-6GHz, -160dBc, Plenum, 4.3/10M-4.3/10M
P2RFC-2453-39	1m ¼" SPP250 Cable DC-6GHz, -160dBc, Plenum, 4.3/10F-4.3/10M
P2RFC-2453-79	2m ¼" SPP250 Cable DC-6GHz, -160dBc, Plenum, 4.3/10F-4.3/10M
P2RFC-2359-39	1m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M-QMAM
P2RFC-2359-79	2m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M-QMAM
P2RFC-4590-39	1m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M-2.2-5M
P2RFC-4590-79	2m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M-2.2-5M
P2RFC-2329-39	1m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M-7/16 DIN(m)
P2RFC-2329-79	2m ¼" SPP250 Cable DC-6GHz, -155dBc, Plenum, 4.3/10M--7/16 DIN(m)

C Enterprises

Since 1984, C Enterprises has been dedicated to manufacturing and delivering reliable, quality connectivity solutions. They invest heavily in their employees to ensure they have the skills to provide customers with the best products and customer service possible. Their world-class US facility is the unbeatable quick-turn solution to all your custom fiber optic and copper cable needs.

C Enterprises' cable assemblies can be ordered at any length needed. Use the base part number followed by the length and unit of measure (-xxF for Feet; -xxM for Meters). Custom connector combinations, labeling, and packaging options are available on request.

Examples:

SASS01SBSBXXXPX-25F: SC/APC Simplex OS2 Patch Cable, 25 feet

SASS01LBLBXXXPX-12M: LC/APC Simplex OS2 Patch Cable, 12 meters

Fiber Jumpers

C Enterprises' SC/APC and LC/APC indoor and indoor/outdoor simplex MDU jumpers are the perfect solution for headend-to-hub and hub-to-remote connections. The simplex design allows jumpers to be installed in current buildings where there may be tight bend radiuses and limited space, including 90-degree corners. Each C Enterprises cable assembly is 100% tested and guaranteed to meet or exceed EIA/TIA FOTP standards for insertion loss and return loss.

Part Numbers	Description
SASS01SBSBXXXPX-3M	SC/APC OS2 Simplex 2mm Patch Cable, 3 meters
SASS01LBLBXXXPX-3M	LC/APC OS2 Simplex 2mm Patch Cable, 3 meters
SARO01SBSBXXXPX-3M	SC/APC OS2 Simplex 3mm MDU Drop Cable, Black, 3 meters
SARO01LBLBXXXPX-3M	LC/APC OS2 Simplex 3mm MDU Drop Cable, Black, 3 meters
SARO01SBSBXXXPW-3M	SC/APC OS2 Simplex 3mm MDU Drop Cable, White, 3 meters
SARO01LBLBXXXPW-3M	LC/APC OS2 Simplex 3mm MDU Drop Cable, White, 3 meters
QFR5R5UCBSW-7F	Cat-6A 28AWG Blue Snagless Patch Cable, 7 feet

Hybrid Fiber Optic and Copper Conductor Cables and Assemblies

C Enterprises' hybrid cable assemblies combine single-mode fiber and copper power conductors under a single jacket to supply remote power and data to DAS and small cell communications equipment. Combining power and data within the same cable eliminates the need for a local power source at each location, and fewer cable pulls mean immediate installation and labor savings.

Part Numbers	Description
XHY-020216PI-LALA-50F	Hybrid Assembly, LC/APC to LC/APC, 2F + 2x16AWG Cu Indoor Tight Buffer Plenum, 18 inch 2mm Breakouts, Pre-Installed in ¾" Plenum Innerduct, Test Report, 2 Labels, Pulling Eye, Length 50 feet
XHY-020216PI-LALA-100F	Hybrid Assembly, LC/APC to LC/APC, 2F + 2x16AWG Cu Indoor Tight Buffer Plenum, 18 inch 2mm Breakouts, Pre-Installed in ¾" Plenum Innerduct, Test Report, 2 Labels, Pulling Eye, Length 100 feet
XHY-020216PI-LALA-150F	Hybrid Assembly, LC/APC to LC/APC, 2F + 2x16AWG Cu Indoor Tight Buffer Plenum, 18 inch 2mm Breakouts, Pre-Installed in ¾" Plenum Innerduct, Test Report, 2 Labels, Pulling Eye, Length 150 feet
XHY-020216PI-LALA-200F	Hybrid Assembly, LC/APC to LC/APC, 2F + 2x16AWG Cu Indoor Tight Buffer Plenum, 18 inch 2mm Breakouts, Pre-Installed in ¾" Plenum Innerduct, Test Report, 2 Labels, Pulling Eye, Length 200 feet

Connecting the Next Generation

Connect today's networks with tomorrow's technology.

RF Industries designs and manufactures a broad range of interconnect products across diversified, growing markets including wireless/wireline telecom, data communications, and industrial.

To learn more about our industry-leading products, visit rfindustries.com

EDGE CONNECTIVITY. SOLiD COVERAGE.

SOLiD provides top-tier cellular communication solutions for challenging indoor and outdoor venues. By innovating and delivering best-in-class mobile coverage, we keep you connected to your business, family, and media, no matter the environment.

To learn more about our unmatched cellular coverage solutions, visit solid.com/us