The power network is changing. It needs the bandwidth and reliability of fiber. OFS brings unique solutions for fiber in the power network.

OFS’ FOX Solution® for Utility and Alternative Energy applications features several end-to-end solutions optimized to distribute fiber in traditional Transmission and Distribution networks and connecting the wind and solar farm with the grid.

**Solutions connecting the transmission and distribution networks:**
- PowerGuide® AccuTube® ADSS Cable featuring AccuRibbon® Optical Ribbon
- PowerGuide DT (Dry Tube) Short Span ADSS Cable
- PowerGuide ADSS Cable
- PowerGuide TR (Tracking Resistant) ADSS Cable
- Pole line attachment hardware and accessories

**Solutions for the substation:**
- OPTION1™ DT Outdoor/Indoor Cable
- Jumpers and pigtails
- Wall Mount Units
- Shelves
- SlimBox™ Modules
- Mechanical Splice-On Connector (MSOC) and Fusion Splice-On Connector (FSOC)

**Solutions for the wind and solar farm:**
- Fortex™ DT (Dry Tube) Loose Tube Cable
- SlimBox 12-Fiber Wall Mount Module
- Jumpers and pigtails

These solutions are field proven in widespread utility and alternative energy deployments around the world.
Cable Choices for the Distribution Network

All-Dielectric, Self-Supporting (ADSS) cables are the choice for the majority of distribution networks (69 kV and lower, single circuit).

ADSS cables can be placed in either the supply zone or communications zone on the pole, are non-metallic, are installed quickly and are rugged enough to provide decades of service on the power line.

OFS PowerGuide ShortSpan DT Cable, the world’s first gel-free ADSS cable, offers the same high performance and reliability as gel-filled counterparts. Plus, it’s completely dry, even inside the buffer tubes.

Fortex DT Single-Jacket Loose Tube and AccuRibbon DC Ribbon Cables are sometimes lashed to an existing messenger wire.

How to specify ADSS cable for distribution lines:
1) Fiber Count and type
2) Max Span Length
3) Environmental Loading Requirements (NESC Light, Medium, Heavy, or other)
4) Special sag/tension requirements

### PowerGuide ShortSpan DT ADSS Cable Specifications for Distribution Applications

<table>
<thead>
<tr>
<th>Fiber Count</th>
<th>2-60</th>
<th>61-72</th>
<th>73-96</th>
<th>97-120</th>
<th>121-144</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Outer Diameter – in. (mm)</td>
<td>CMEA Design</td>
<td>0.47 (11.8)</td>
<td>0.51 (12.8)</td>
<td>0.59 (14.8)</td>
<td>0.67 (16.9)</td>
</tr>
<tr>
<td>CLGA Design</td>
<td>0.46 (11.7)</td>
<td>0.50 (12.7)</td>
<td>0.58 (14.7)</td>
<td>0.66 (16.8)</td>
<td>0.73 (18.5)</td>
</tr>
<tr>
<td>Cable Weight – lb/kft (kg/km)</td>
<td>CMEA Design</td>
<td>64 (95)</td>
<td>67 (99)</td>
<td>91 (135)</td>
<td>120 (178)</td>
</tr>
<tr>
<td>CLGA Design</td>
<td>63 (93)</td>
<td>66 (98)</td>
<td>89 (133)</td>
<td>119 (177)</td>
<td>143 (213)</td>
</tr>
</tbody>
</table>

**Performance Standard (all cables)**

Tested per Applicable Requirements of Telcordia Technologies GR-20, ANSI/ICEA S-87-640, EIA/TIA, IEEE-1222 and PHU PE-90.

**Handling (all cables)**

| Minimum Bend Radius, With Load* | 15 x OD |
| Minimum Bend Radius, With No Load* | 10 x OD |
| Minimum Bend Radius, Storage Coils* | 10 x OD |
| Maximum Rated Cable Load (MRCL) | Variable |
| Maximum Long Term Load | Variable |

* OD = Outer Diameter of Cable
Specification and Ordering Information:

1) Determine fiber count
2) Identify loading district and maximum span length use to identify last 4-characters of cable part number
3) Choose cable length (route length + 1.5% for sag + spare cable)
4) Identify cable attachment and accessory hardware

| PowerGuide ShortSpan DT Cable Capabilities (1.5% installation sag) * |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Fiber | Max Span (1.5% installation sag) (ft) (NESC Light) | Max Span (1.5% installation sag) (ft) (NESC Med) | Max Span (1.5% installation sag) (ft) (NESC Heavy) | Diam (in) | Weight (lb/1000 ft) |
| CLGA Design | CMEA Design | CLGA Design | CMEA Design | CLGA Design | CMEA Design | CLGA Design | CMEA Design |
| Up to 48 | 675 | 1070 | 590 | 770 | 375 | 475 | 0.46 | 0.46 | 59 | 60 |
| Up to 72 | 800 | 980 | 590 | 730 | 375 | 450 | 0.50 | 0.50 | 67 | 68 |
| Up to 96 | 800 | 950 | 640 | 750 | 410 | 490 | 0.58 | 0.58 | 90 | 92 |
| Up to 144 | 730 | 830 | 690 | 790 | 480 | 540 | 0.73 | 0.73 | 145 | 146 |

* Detailed sag and tension available – contact OFS for more information

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**Example:** AT-3BE17NT-NNN-CME1

- **Fiber Count**: 002 – 144
- **Sheath Core**: T = 12 fibers
- **Fiber Type**: AllWave® ZWP Single-Mode
- **Sheath Construction**: Single Jacket All-Dielectric
- **Tensile Load**: PowerGuide ShortSpan
- **Core Type**: All-Dry ADSS Loose Tube
- **Fibers per Tube**: N = 002 – 144
- **Cable Ordering Information**: OFS OPTICAL CABLE AT-3BE17NT-NNN-CMEA [MM-YY] [HANSET SYMBOL] [NNN]v [SERIAL #]

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1. Part Number shown is for standard AllWave® ZWP fiber attenuation and standard cable print: Maximum AllWave® ZWP fiber attenuation: 0.35/0.31/0.27/0.25/0.27 dB/km (1310/1385/1490/1550/1625 nm)
2. Contact OFS Order Management for information on other cable variations, including additional fiber types, attenuation, and custom cable print.
3. Custom/Special (XXXX): Consult with us regarding your application, span lengths, and loading conditions to complete the custom design and part number of your complete sheath strength system.
How to Specify ADSS Cable

Hardware Choices for the Network

Dead End Assembly
- Used whenever a cable should not slip
  - Cable start and end points
  - Where line angles exceed 20°
  - Road, river, railroad crossings
  - Closure locations
- Different types available dependent upon cable design and application
- Most attachment hardware is used with 5/8” pole line hardware

Tangent and Suspension Supports
- Typically used in small line angle (<20°, depending on type) situations
- Provides vertical support, not designed to support cable tension
- Multiple types depending span length and application
- Allows cable slippage during imbalanced load situations

Vibration Dampers
- ADSS cables can experience Aeolian vibration under certain circumstances
- Circumstances conducive to Aeolian vibration
  - Laminar wind flow, Wide open spaces, Light winds, High tensions
- Vibration dampers minimize the effects of this vibration

Corona coils
- Used to mitigate the effects of corona in EHV environments

//...//

Cable storage devices
- Used to store spare cable on the span or on the pole
  - Cable Protection Sleeve
  - Fiber Storage Rack

To Substation
Cable Choices for the Transmission Network

- **PowerGuide TR (Tracking Resistant) ADSS Cable for EHV applications (typically ≥ 115 kV)**
- **PowerGuide AccuTube ADSS Cable with AccuRibbon Optical Ribbon for extra high fiber count applications** (up to 864)

Since all transmission lines are different most PowerGuide cables are custom-designed. Custom-designing does not add to the cost of the cable, and provides the best cable for the application

### Which ADSS Cable is Right for My Transmission Line Network?

<table>
<thead>
<tr>
<th>Fiber Count</th>
<th>Typical Line Voltage (kV)</th>
<th>Space Potential (kV)</th>
<th>Span Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerGuide ADSS</td>
<td>&lt; 288</td>
<td>≤ 115</td>
<td>≤ 12</td>
</tr>
<tr>
<td>PowerGuide TR</td>
<td>&lt; 288</td>
<td>≤ 115</td>
<td>≤ 12</td>
</tr>
<tr>
<td>PowerGuide AccuTube</td>
<td>&lt; 864</td>
<td>≤ 115</td>
<td>≤ 25</td>
</tr>
</tbody>
</table>

### How to specify ADSS cable for transmission lines:
1. Fiber Count and type
2. Max Span Length
3. Environmental Loading Requirements (NESC Light, Medium, Heavy, or other)
4. Line Voltage – For applications ≥ 115 kV, special conductor and phasing information will be needed
5. Special sag/tension requirements
6. Hardware is customized for the application
For the Substation – Fiber Management

OFS has a full set of fiber management components for the substation or central office.

- As the original inventor of the industry-standard LGX® panel and LC connector, the OFS lineage brings a wealth of knowledge and product options to simplify fiber management in the central office or substation
- Product options available for high and low fiber count networks
- Numerous solutions to simplify your installation

**OSP Cross-Connect Cabinet** – Used to cross connect fibers in the field away from substations

- Up to 240 fibers
- Can splice inside or outside of the cabinet

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**Inside Plant Equipment Options**

- **Wall-Mounted panels for splicing and patching**
- **Wall-Mounted Unit (WMU)**
- **Optical Cable Entrance Facility (OCEF)**
  - With capacity to 1440 fibers

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**Common rack-mounted combination unit solutions**

**Contact OFS for specific configuration**

<table>
<thead>
<tr>
<th>Fiber Count</th>
<th>Partial Item Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>LSC1W-024</td>
</tr>
<tr>
<td>48</td>
<td>LSC1W-048</td>
</tr>
<tr>
<td>96</td>
<td>LSC1W-096</td>
</tr>
<tr>
<td>144</td>
<td>LSC1W-144</td>
</tr>
<tr>
<td>288</td>
<td>LSC1W-288</td>
</tr>
<tr>
<td>432</td>
<td>LSC1W-432</td>
</tr>
</tbody>
</table>

**Pre-terminated patch panels** – simply splice into the outside plant cable

**Combination patching and splicing units** – 2 functions in one unit

**Adapter Plates** for every application
### Typical Material List for a 12-Fiber Network

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT-3BE12YT-012</td>
<td>12-Fiber Fortex DT Cable with All-Wave ZWP Fiber</td>
<td>Distance between turbines + 15 feet per turbine</td>
<td>12 fibers/turbine is common</td>
</tr>
<tr>
<td>SLIMBOX-V, INDOOR MDU-12F-SM-SCU-PT</td>
<td>12-Fiber SlimBox Module pre-loaded with pigtailed and SCU connectors</td>
<td>2 per turbine</td>
<td>Use either SlimBox Module or 1RU Combination Panel</td>
</tr>
<tr>
<td>1U S-LIU SC12 Blue PT (300523784QT)</td>
<td>1 RU Combination Panel, SCU Connectors, pre-loaded with pigtailed</td>
<td>1 per turbine</td>
<td>Alternative to the SlimBox Module, SC Connectors</td>
</tr>
<tr>
<td>1U S-LIU LC12 BLUE PT (300524097)</td>
<td>1 RU Combination panel, LCU Connectors, pre-loaded with pigtailed</td>
<td>1 per turbine</td>
<td>Alternative to the SlimBox Module, LC Connectors</td>
</tr>
<tr>
<td>S922 Protective Sleeves</td>
<td>40 mm splice sleeves</td>
<td>Up to 24 per turbine – one per splice</td>
<td>Used to protect splices</td>
</tr>
<tr>
<td>JR3WB001SCUSCU003F</td>
<td>3 foot pigtail – SCU connector</td>
<td>Up to 24 per turbine – one per splice</td>
<td>Spliced to main cable</td>
</tr>
<tr>
<td>JR3WY001LCUUNC006F</td>
<td>3 foot pigtail – LCU connector</td>
<td>Up to 24 per turbine – one per splice</td>
<td>Alternative with LC connectors</td>
</tr>
<tr>
<td>JR3WB001SCUUNC006F</td>
<td>6 foot jumpers – SCU-SCU</td>
<td>Up to 24 per turbine – one per fiber</td>
<td>Used to connect to electronics</td>
</tr>
<tr>
<td>JR3WY001LCULCU006F</td>
<td>6 foot jumpers – LCU-LCU</td>
<td>Up to 24 per turbine – one per fiber</td>
<td>Alternative with LC connectors</td>
</tr>
</tbody>
</table>

### Typical Arrangement of Control Box

- **SlimBox Module** used to hold splices and connectors
- **Industrial Ethernet Switch**
- **SlimBox Module**
- **Pigtails spliced to ends of fibers of cable**
- **12-Fiber Fortex DT Cable to Other Control Boxes**
- **SlimBox Module**
- **SC-SC Jumper**
- **SC Pigtail**
- **S922 Protective Sleeves**
- **1RU Combination Panel**
- **Underground Fiber Optic Network**
- **Control Box**
Connectorization Options

Pre-connectorized options
OFS brings a variety of connectorization options for MDU environments.

- All distribution systems, HomeRun Indoor and Outdoor MDU Cabling, V-Linx™ components, and riser cables are available in a variety of pre-connectorized lengths

Cables
- Pigtails, jumpers and patch cords are also available in customized lengths and configurations for no additional charge

Field-Installable Connectors
Fusion splice-on connectors (FSOC) or Mechanical splice-on connectors (MSOC) can be installed on-site in the field.

The main advantage of a field installable connector is to eliminate slack management issues.

Fusion Splice-on Connectors use a cleaver and fusion splicer to splice a connector to the fiber.
Available in a variety of connector ends with two different connector types.

Mechanical Splice-On Connectors only need a cleaver for installation. Available in a variety of common connector ends

1. Strip coating
2. Place fiber in Fiber Holder
3. Insert fiber into connector
4. Remove wedge by pushing lever
5. Cleave Fiber
6. Complete!
The Fiber is the Network™

Power providers need the proven reliability of 100% synthetic silica fiber.

While other fibers may contain natural quartz in the fiber fiber, OFS AllWave, TrueWave, and LaserWave® Fibers are made with ultra-pure synthetic silica.

Although all fibers have a small amount of impurities, ultra pure synthetic silica minimizes risk of impurities that could cause alkali-based hydrogen aging losses, or degradation of strength.

Ultra-pure synthetic silica also provides the backbone for Zero Water Peak attenuation performance. OFS' AllWave ZWP Fiber features low optical loss across the entire spectrum from 1260 – 1625 nm, providing a 50 percent increase in usable spectrum, enabling 16-channel CWDM as well as DWDM support.

The fiber is made using a patented manufacturing technology that permanently removes the water peak defect for low, stable loss performance in the 1400 nm window.

AllWave® ZWP Fiber

Zero Water Peak

Compatible with Conventional Single-Mode Fiber, but with More Available Spectrum

Figure 1. High purity synthetic silica fiber (OFS AllWave ZWP Fiber)

Figure 2. Natural quartz raw material fiber clearly shows many pits and imperfections (competing fiber). Bumpy condition shows difference between pure and clean synthetic silica vs natural quartz with its impurities and inclusions.