FTTX Solutions

Multiport Service Terminal (MST) and Hardened Drop Cables

TE Connectivity's (TE) FTTX infrastructure solutions are designed from the ground up to meet the unique requirements of FTTX networks. Designed for operational efficiency and scalability, TE's FTTX solutions simplify network installation, maintenance and management from the central office/head end to the outside plant.

The Multiport Service Terminal (MST) incorporates hardened connector technology that is designed to withstand the rugged outside plant environment. These uniquely designed hardened connectors are factory-terminated and environmentally sealed for use in optical drop cable deployments.

TE's Hardened Cables are environmentally robust to provide a reliable interface for fiber drop cables in the outside plant environment. At the same time, the hardened connector approach dramatically reduces splicing labor requirements. The rugged optical connector is hardened to protect against extreme temperature, moisture, UV, chemical exposure and other harsh conditions typically found in the outside plant.

BENEFITS:

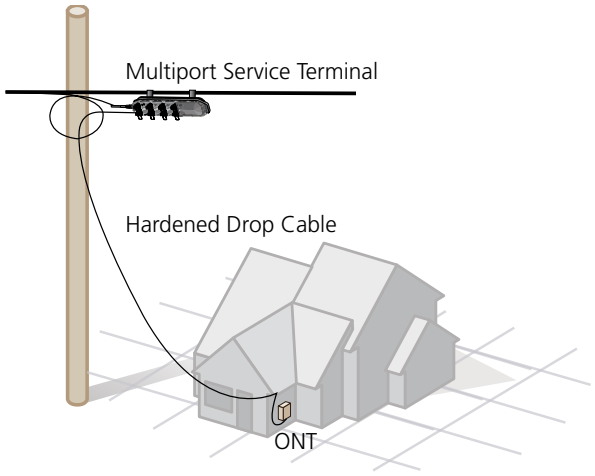
- Robust environmental performance: Withstands extremes in temperature and conditions
- Technician-friendly features: Intuitive design for ease of use
- Decreased installation and incremental maintenance hours: Significant savings
- Protection: Self-contained unit features hardened connectors for superior durability and reliability in the drop segment of the network
- Compatibility: Interoperability with industry standard hardened connectors

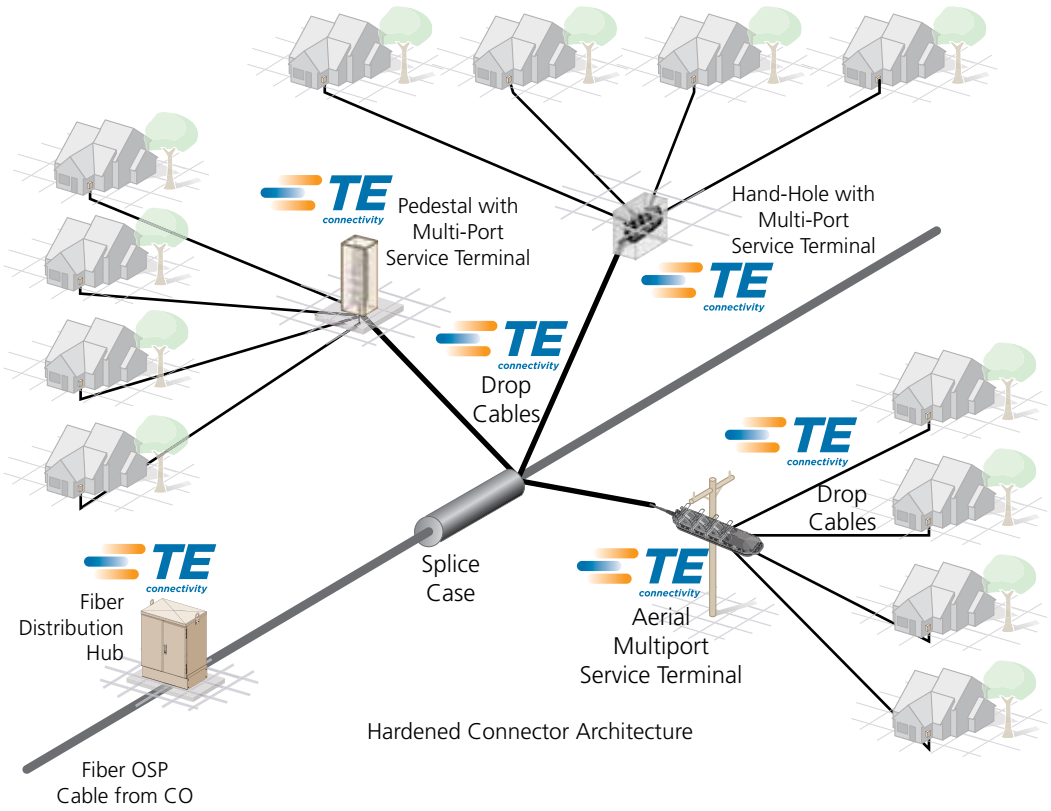
TE connectivity

Hardened Connector Architecture

BENEFITS

- The ultimate "Plug and Play" solution for durable and reliable service connection in the outside plant/drop segment of the network
- Technician-friendly and greatly simplifies installation and maintenance by minimizing splicing required on the distribution side of the network
- Cost effective solutions that provide for lower overall installed costs throughout the FTTX network
- Facilitates easy troubleshooting as maintenance can be done at the MST by simply unplugging a connector rather than breaking a splice or going directly to the side of the home





Hardened Connector Architecture

Business Case: Hardened Connector Technology vs. Field Splicing

A cost model comparing the installation costs of the traditional spliced FTTX architecture with one that incorporates MST hardened connector technology in a 192-home subdivision is provided below. Using the MST model, cable costs decreased by over 85% due primarily to the
cable now being included in the terminal costs. The cost of pulling fiber cables decreased by
about 25% and splicing costs were about 70% lower. Even though the MST approach added additional costs for service terminals, the overall cost was significantly lower for the distribution side of the network—approximately 19% less
per home passed.

The drop cable portion of the network, between the service terminals and the ONTs, also reaps many advantages through a hardened drop connector approach. The technician can simply use a pre-connectorized drop cable, pre-connectorized at both ends in the factory and cut to specific lengths, to install between the service terminal and the home. These cables can be installed by any technician, possibly the same person connecting the electronics at each home. This greatly reduces the cost of drop cable installations in terms of time and skill level. A technician simply has to clean the connector faces at each end and plug them in.

The overall cost of using factory-connectorized drop cables in place of spliced bulk drop cable was at least 25% less. Since service providers can realize a combined savings of nearly 25% in the entire OSP portion of the fiber plant, the business case for the architecture that incorporates MST hardened connectors is compelling.

Furthermore, additional operational savings can be reaped over the life of the network. The operational cost savings gained from having a connectorized FTTX infrastructure becomes evident in terms of faster service turn-up, ease of maintenance and troubleshooting, the need for fewer splice technicians/equipment, and overall fewer truck rolls. Overall, the hardened drop connector approach incurs lower total installed costs for the FTTX network.

Spliced Approach		**Hardened Drop Connector Approach**	
Hand-Hole Costs	$10,000.00	Hand-Hole Costs	$11,194.00
Cable Costs	$15,000.00	Cable Costs	$1,538.00
Cable Placing Costs	$75,000.00	Cable Placing Costs	$56,650.00
Splicing Costs	$9, 072.00	Splicing Costs	$2,988.00
Terminal Costs	$0.00	Terminal Costs	$16,072.00
Total Costs **Cost/Home Passed**	**$109,072.00** **$568.08**	**Total Costs** **Cost/Home Passed**	**$88,442.00** **$460.63**

Specific cost model based on a phased project for a 192 home subdivision, featuring eight homes per block.

FTTX Solutions

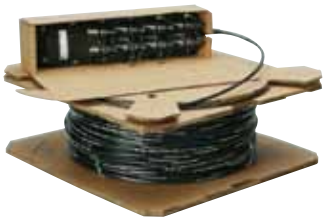
Multiport Service Terminal (MST)

FEATURES

- Available in 2, 4, 6, and 8 port configurations
- Flexible mounting options including pole, pedestal, hand hole or strand to support both aerial and below grade applications
- Tested to meet GR-326, GR-771 and GR-3120 standards for robust environmental performance
- Connection interface utilize factory terminated high-performance SC/APC connectors
- Hardened adapters provide environmentally secure interface for fiber drops
- Factory sealed enclosure provides resistance to environment
- Improved structural design withstands stress and impact
- Re-enterable enclosure allows for easy technician access for repairs
- Superior cable and fiber management ensures proper bend radius, prevents cable strain and minimizes kinking
- Available with dielectric and armored input stub cables in standard lengths
- Compatible with legacy hardened connector systems
- User-friendly packaging allows for easy un-spooling

MST Specifications

Terminal	Dimensions (LxWxH)	Ports/Homes Served
MST-02	12.14" x 3.95" x 2.86" (30.84 x 10.03 x 7.26 cm)	2
MST-04	12.14" x 3.95" x 2.86" (30.84 x 10.03 x 7.26 cm)	4
MST-06	17.34" x 3.95" x 2.86" (44.04 x 10.03 x 7.26 cm)	6
MST-08	17.34" x 3.95" x 2.86" (44.04 x 10.03 x 7.26 cm)	8



MST ORDERING INFORMATION

Part Number

MST - __ __ M H 0 0 - __ __ __ __ __ U

Terminal Model

02	2-Port
04	4-Port
06	6-Port
08	8-Port

Cable Type

A	Dielectric – Flat – Loose Tube
B	Locatable – Flat – Loose Tube
C	Armored – Round – Loose Tube

Cable Stub Length

0050	50 Feet
0100	100 Feet
0250	250 Feet
0500	500 Feet
0750	750 Feet
1000	1000 Feet
1500	1500 Feet
2000	2000 Feet

Standard lengths shown.

FTTX Solutions

Multiport Service Terminal (MST)

The 4x3 terminal body is optimized form factor below grade enclosures and hand holes. The 12 port configuration provides superior technician access by providing three rows of four hardened adapters.

MST Specifications

Terminal	Dimensions (LxWxH)	Ports/Homes Served
MST-06	11" x 6" x 3.25" (27.94 x 15.24 x 8.25 cm)	6
MST-08	11" x 6" x 3.25" (27.94 x 15.24 x 8.25 cm)	8
MST-12	11" x 6" x 3.25" (27.94 x 15.24 x 8.25 cm)	12

MST ORDERING INFORMATION

Part Number

MST - __ __ R H 0 0 - __ __ __ __ __ U

Terminal Model

06	6-Port
08	8-Port
12	12-Port

Cable Type

A	Dielectric – Flat – Loose Tube
B	Locatable – Flat – Loose Tube

Cable Stub Length

0050	50 Feet
0100	100 Feet
0200	200 Feet
0500	500 Feet
0750	750 Feet
1000	1000 Feet
1500	1500 Feet
2000	2000 Feet

Standard lengths shown.

MST Universal Mounting Brackets

TE's MST products have a versatile mounting scheme, allowing all versions of the product to be mounted on a pole, in a pedestal, in a hand hole or to a strand in support of both aerial and below grade applications. All mounting solutions provide a robust, user friendly and cost-effective option for delivering fiber optic service drops in FTTX deployments and allow for efficient craft access to connections.

Pole Mount

Pedestal Mount

Hand Hole Mount

Strand Mount

TE's MST Universal Mounting Brackets provide a universal mounting solution to support the versatile MST mounting options including pole, pedestal, hand hole and strand applications. These brackets provide for simple, secure, economical and rapid terminal installation in any FTTP deployment.

FEATURES

- Single bracket compatibility for all mounting schemes
- Designed to save time and cost, reduce complexity and necessary logistics, and streamline process of mounting MST
- Snap-in/snap-out installation easily engages/disengages MST with an audible snap engagement and single latch release making MST readily available for drop cable connections or re-connections
- Rigid plastic structure using same materials as MST to withstand environmental exposures, including contracting/expanding temperatures
- Bracket mounted separately minimizing risk of damage to MST
- Eliminates need for additional bracket inventory and materials in field
- Stands up under high vibration or stress created by cables placed in the MST

MST Mounting Accessories

ORDERING INFORMATION

Product Description	Part Number
Universal Mounting Bracket	
2- and 4-port dielectric cable stub MST	MST-UMB-0204
6- and 8-port dielectric cable stub MST / 2- and 4-port armored stub MST	MST-UMB-0608
4x3 Terminal in all Configurations.	MST-UMB-4312
Strand Mount Bracket	MST-ACC-M02
8" Pedestals[1]	
with Vented Cover	MST-ACC-W10
with Bell Jar Cover	MST-ACC-Y10
with Vented Cover and Grounding	MST-ACC-W10G
with Bell Jar Cover and Grounding	MST-ACC-Y10G
Hand Hole Kits	
33.25" L x 22.50" W x 24.00" H kit with swing arm	MST-ACH-C730Y300
40.00" L x 28.50" W x 24.00" H kit with swing arm	MST-ACH-C436Y300

[1] Industry standard pedestals with mounting hardware also available. Please contact the TE Technical Assistance Center at 1-800-366-3891 for more information.

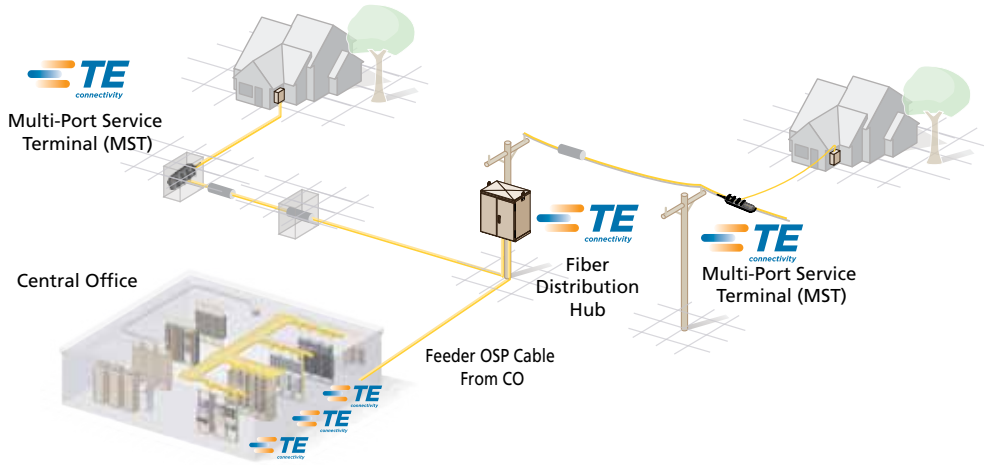
Pole Mount Installation

Below Grade Installation

Aerial Mount Installation

APPLICATION

Hardened Connectors are used to connect Multiport Service Terminals (MST) typically located at the street with Optical Network Terminals (ONTs) located at the premises. The hardened connector is connected to hardened adapters on the enclosure's external surface so that connections can be completed without opening the enclosure. The application facilitates rapid deployment of optical services by quickly and efficiently connecting hardened connectors to the terminal at the street and the ONT at the premises. Hardened connectors may be installed anywhere fiber terminals are installed including aerial and below grade applications.



SC TECHNOLOGY

The hardened connector is based on standard SC connector technology. The hardened connector contains an SC style inner connector as the basis for coupling inside the connector thus conforming to industry standards including GR-326 and FOCIS. The SC connector allows easy and secure connection while ensuring reliability and compatibility with a wide range of SC connectors and adapters currently on the market. This hardened connector is fully compatible with legacy hardened adapter systems that utilize the SC as the core of the adapter design.

CABLE TYPES

TE's Drop Cable assemblies are available with hardened connectors in several different cable configurations, including:

- Flat Dielectric Cable
- Flat Dielectric Cable with 24AWG Toneable Wire

All cables used with the hardened connector are tested to GR-20 and designed to GR-3120.

SIZE AND CONFIGURATION

TE's drop cable assemblies with hardened connectors are available in standard lengths from 75 to 2000 feet. Longer or shorter assemblies are available upon request. Cable assemblies are available with one or both ends connectorized. Single ended connectorized cables may sometimes be spliced at the premises.

FEATURES

- Single-fiber, single-mode hardened connector SC APC drop cable assemblies
- Available with one or both ends connectorized
- Available standard lengths – from 75 to 2000 ft increments (longer assemblies available upon request)
- Environmentally sealed connector
- Easy connection to hardened adapters on terminals or closures
- Arrow on hardened connector shell ensures precise alignment of connector into optical port.
- Connector can be pulled through 1.25-inch conduit
- Pulling eye on connector cap is designed for 100 lb. maximum pulling tension
- Drop cable fully tested to GR-20 and designed to GR-3120

FEATURES

- Provide the ultimate "Plug and Play" solution for durable and reliable service connection in the outside plant/drop segment of the network
- Technician-friendly to greatly simplify installation and maintenance by minimizing splicing required on the distribution side of the network
- Cost effective solutions that provide for lower overall installed costs throughout the FTTX network

HARDENED DROP CABLE ORDERING INFORMATION

Part Number

FHD - H __ 1 __ - 0 __ __ __ __ __

Connector 1

H	Hardened ASC

Connector 2

H	Hardened ASC
0	Stub end/none

Cable Type

A	Dielectric/Flat
B	Locatable/Flat

Unit of Measure

F	Feet

Length

XXXX	Length

Standard Lengths (all in feet):

Single Ended Cables

75	100	150	200
250	300	400	500
750	1000	1500	2000

Double Ended Cables

105	120	135	150
165	180	200	250
300	350		

FTTX Solutions
Hybrid Cables

As the leader in flexible, value added cable management solutions, TE allows customers to connect the Optical Network Terminal (ONT) to the drop point in multiple ways:

- Hardened connectors
- Spliced cables
- Standard SC adapters

FEATURES

- Standard connector on one end, stub or hardened connector on other end
- 18" 2.0 mm breakout from flat drop cable
- Dielectric toneable cable type
- Ability to be pulled through smaller conduit sizes (1/2", 3/4")
- Eliminates need for purchased pigtails and splice tray at ONT

ORDERING INFORMATION

Product Description	Part Number
Universal Mounting Bracket	
105'	FHD-HJ1B-0105F
120'	FHD-HJ1B-0120F
135'	FHD-HJ1B-0135F
150'	FHD-HJ1B-0150F
165'	FHD-HJ1B-0165F
180'	FHD-HJ1B-0180F
200'	FHD-HJ1B-0200F
250'	FHD-HJ1B-0250F
300'	FHD-HJ1B-0300F
350'	FHD-HJ1B-0350F
8" Pedestals1	
100'	FHD-J01B-0100F
150'	FHD-J01B-0150F
200'	FHD-J01B-0200F
250'	FHD-J01B-0250F
300'	FHD-J01B-0300F
500'	FHD-J01B-0500F
1000'	FHD-J01B-1000F
1500'	FHD-J01B-1500F
2000'	FHD-J01B-2000F

*Other Lengths and Configurations Available, Contact TE's Technical Assistance Center 800-366-3891

FTTX Solutions

Hardened Connector Test Kit

TE's Hardened Connector Test Kit is a durable, waterproof and portable bag that houses all the testing and maintenance tools needed for a hardened connector architecture. This kit includes a heavy duty water-resistant carrying case with individual pockets for organizing the test cables, adapters, cleaning kit, technical cleaning and turn-up documentation and the product reference sheet. The rugged case also allows for additional space for carrying other related items and/or test equipment required by the technician.

FEATURES

- Durable, waterproof, and portable bag houses all testing and maintenance tools needed for a hardened connector architecture
- Test cables and adapters provide transition from hardened to standard SC connector interfaces
- Cleaning kit for the hardened drop cable/adapter includes a cleaning cassette and 50 hardened adapter cleaning swabs
- Quick reference ordering guide is included to replenish kit consumables
- Simplified turn-up and cleaning instructions
- "One-stop" test resource for technicians supporting hardened connector architectures
- "User friendly" packaging to accommodate additional space/compartments for key testing equipment (i.e. OTDRs, power meters) to support overall technician needs

ORDERING INFORMATION

Product Description	Quantity	Part Number
Hardened Connector Test Kit	1	FHD-TKIT-1
Individual Components of the Hardened Connector Test Kit:		
Hardened Connector Test Kit Bag	1	FHD-TKIT-BAG
Test Cable, 10', 3.0 mm, hardened connector to standard APC SC connector	1	FHD-HJ1R-0010F
Test Cable, 10', 3.0 mm, hardened connector to standard UPC SC connector	1	FHD-HN1R-0010F
Test Cable, 10', 3.0 mm, hardened connector to stub	1	FHD-H01R-0010F
APC SC to APC SC Jumper, 3M	1	FPC-APSC-S-3M
APC SC to UPC SC Jumper, 3M	1	FPC-SPSC/APSC-S-3M
Hardened Adapter - Hardened to standard APC SC	2	RC-ADP-SCA-SM
Hardened drop cable/adapter cleaning kit; includes hardened connector cleaning cassette (150 uses) and fifty (50) hardened adapter cleaning sticks	1	FHD-ACC-CLNKIT1
MST/hardened drop cable user manual	1	ADCP-96-040
Accessories		
Cleaning swabs	50	FHD-ACC-CLNCTN
Cleaning Cassette	1	FHD-ACC-CLNCSS

DATA SHEET

ADC is now TE Connectivity

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