
BLACK BOX WHITEPAPER: THE BENEFITS OF PRE-TERMINATED FIBER

LEAVE THE TECH TO US





The demands on today's IT professionals in managing data center challenges is driving the growth of pre-terminated fiber.

**MODULAR. AGILE. FLEXIBLE.
SCALABLE. MISSION-CRITICAL.
RELIABLE. COST-EFFICIENT. ROI.**

These terms all describe the demands placed on today's modern data center and the data center professional.

As technology ever evolves, data center professionals face increasing demands in terms of juggling the management of the data center while supporting the enterprise and achieving corporate goals. In addition, data center professionals need to plan for and facilitate network changes and future growth with minimum downtime and disruption.

Going hand-in-hand with these challenges, is the need to deploy data center projects faster, more efficiently, and at the best price possible. To accomplish this, IT professionals are increasingly turning to the use of pre-terminated fiber optic cable.

THE SIX BENEFITS OF PRE-TERMINATED FIBER

First, let's define what pre-terminated fiber cable is. It's bulk fiber cable in which all of the fiber strands are connectorized and performance tested at the factory instead of in the field. Pre-terminated fiber is used for runs between the data center and telecom rooms, switches, patch panels, servers, and zone distribution areas. Pre-terminated fiber offers IT professionals a number of advantages. Let's examine each in detail and how they can benefit you.

ADVANTAGES

The benefits of pre-terminated fiber versus field-terminated fiber include:

- ◆ Faster Deployments
- ◆ Better Transmission
- ◆ Guaranteed Performance
- ◆ Improved Reliability/Durability
- ◆ Easier Project Planning
- ◆ Reduced Total Cost of Ownership



1. FASTER DEPLOYMENTS

Plug-and-Play. Pre-terminated fiber arrives ready to work. Because it's already terminated and tested at the factory, all you need to do is unpack the box and start the deployment. Technicians can install the fiber up to 80% faster by eliminating the most time-consuming process of fiber deployments—field termination, hand polishing, inspections, and performance testing. To aid in installation and to prevent excess pulling strain on the fiber, pre-terminated fiber cable can be produced with pulling eyes.

No Cable Prep. Deployments go much faster as all necessary cable prep time in the field is eliminated. There's no need to spend time ordering and assembling all the necessary termination equipment, tools, splicers, connectors, consumables, and testers. No prep time also means there are no scraps and waste to clean up and no tools and materials to put away.

2. BETTER TRANSMISSIONS

Factory terminations inherently provide better connections than those done in the field, which can easily introduce human error. Factory terminations are professionally polished and tested significantly reducing link failures.

In addition, because the cable is produced in a clean environment, performance robbing dust, dirt, and other contaminants from field conditions are eliminated. The result is improved loss budgets and better transmission performance.

3. GUARANTEED PERFORMANCE

Factory terminated cable comes with a performance guarantee from the manufacturer. This eliminates any issues and rework you may have to deal with from improperly field-terminated cables.

Producing high-quality fiber is a precise business and requires thorough and detailed inspection and testing every step of the way. While every cable is unique, fiber termination demands strict adherence to controlled and documented procedures. Fiber cable is manufactured within stringent parameters from stripping the cable and curing the epoxy to fitting and polishing the ferrules. To guarantee performance, factory terminated fiber cable is put through a number of standard tests. When choosing a pre-terminated fiber manufacturer, make sure to look for one that has ISO 9001 certification for procedures and processes, such as Black Box.

GEOMETRY TESTS

Apex Offset. This test measures the distance from the peak of the fiber radius, or the apex, to the center of the fiber. It measures the degree to which the end face "dome" is centered. This ensures physical contact on mating.

Radius of Curvature. This is the radius of the spherical end face formed during polishing. This ensures that both fibers make contact. The radius of curvature needs to be within certain parameters to ensure proper apex offset and fiber height.

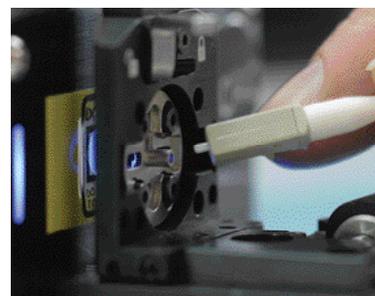
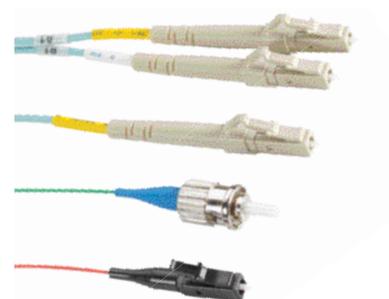
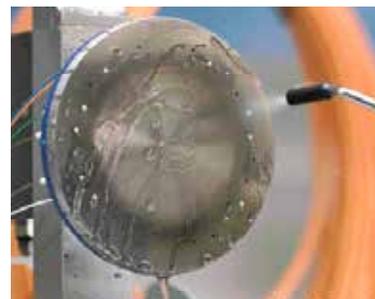
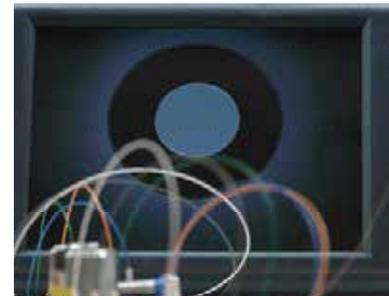
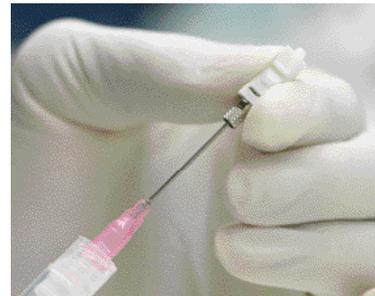
Fiber Height. This measures the height that the fiber core protrudes or the depth that it is recessed into the ferrule surface. The fiber must fall within certain test parameters to ensure proper physical contact.

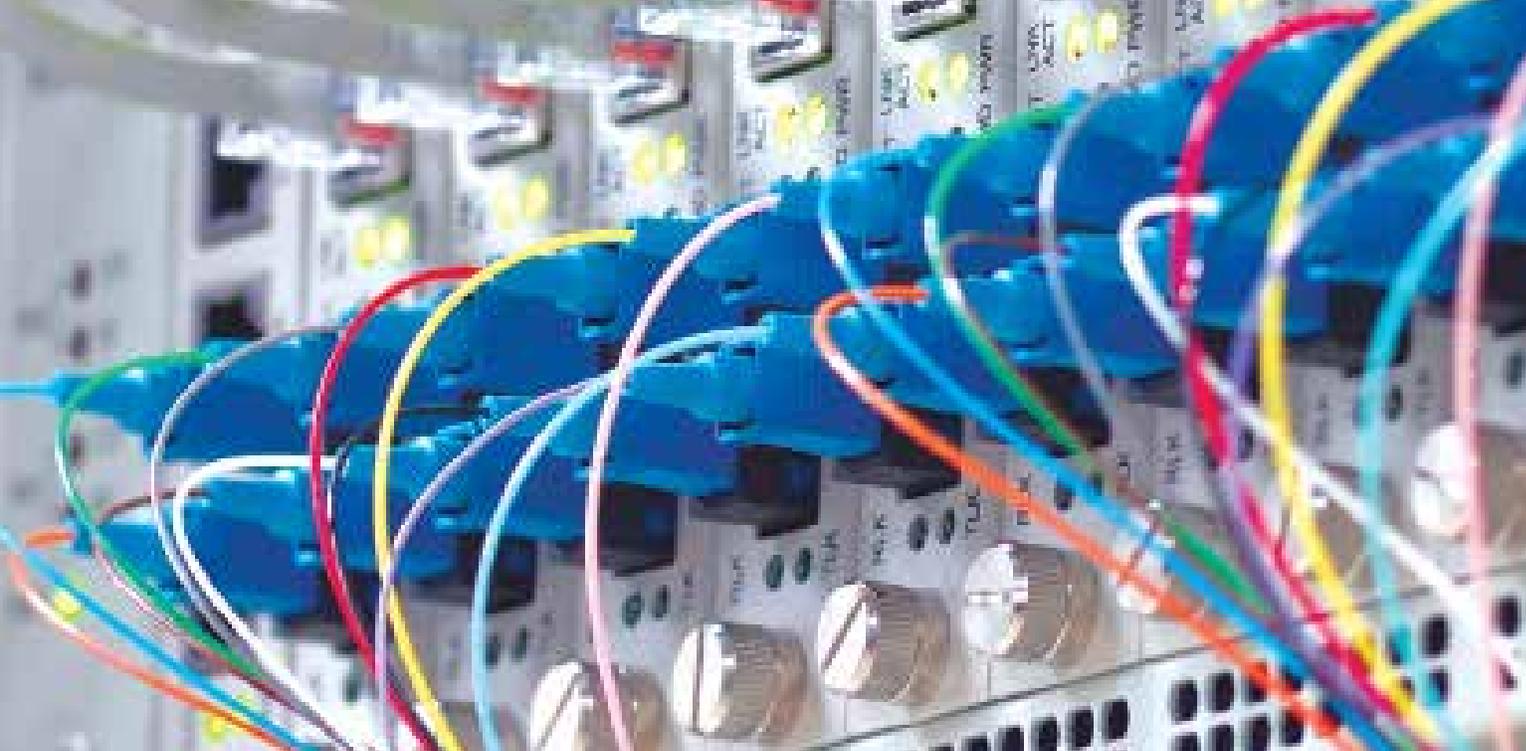
END-FACE INSPECTIONS

One of the most common causes of failure are visual defects such as scratches, pits, and fractures in the fiber end face, which can become more pronounced over time and affect performance. Inspections are done throughout the manufacturing process to check for contamination-free, smooth end faces. Because pre-terminated fiber cable is produced in clean environments, contamination and performance degradation from dirt and dust is minimized.

LINK LOSS

This is the critical test for ensuring performance and measuring the cable's ability to transmit signals. Factory termination ensures a better ferrule-to-fiber fit to minimize back reflection and improve link loss.





4. IMPROVED RELIABILITY/DURABILITY

Field terminations can be fraught with error. Depending on the field conditions and the level of expertise of the technicians, terminations can vary from connector to connector and from technician to technician. Then they may or may not pass field tests leading to costly and time-consuming rework. A few estimates put the amount of field rework as high as 80%. Some technicians may never heed their mother's advice of "do it right, or do it twice."

Factory-terminated connectors are polished to perfection providing better reliability, more durability, and a much longer service life than field-terminated connectors.

5. EASIER PROJECT PLANNING

There are a few ways pre-terminated fiber can help you manage fiber deployments. First, in terms of planning, you have to know exactly what cable you need, when you'll need it, and how many techs you'll need for the install. This also gives you better oversight on material and labor costs. You'll also have fewer components to order and fewer vendors to deal with. You also eliminate the need to manage and schedule different contractors in terms of the deployment.

In addition, pre-terminated fiber gives you the ability adapt to network changes quickly with a minimum of downtime.

6. REDUCED TOTAL COST OF OWNERSHIP

Some people think pre-terminated fiber is more expensive to use. But when all aspects of it are considered, it may actually

be a more cost-efficient choice that reduces the total cost of ownership and improves your ROI. Let's take a look at the reasons why.

Labor. This is one of the greatest cost components in deploying a fiber network. By using pre-terminated fiber, you'll greatly reduce your labor costs for installation, possibly by as much as 70% to 80%. The most obvious reason is the elimination of any labor expenses for cable prep, field terminations, testing, and rework, which can increase installation time, and labor, by as much as 50%.

Second, you have to consider the skill level of your technicians. Plug-and-play pre-terminated fiber does not require highly skilled technicians with advanced fusion-splicing experience who command higher labor rates. You only need to plan and budget for techs to pull and connect the cable. Smaller staff and less experienced techs mean a lower labor bill.

Equipment and Waste. By using pre-terminated fiber, you'll eliminate the need to buy a lot of stuff: connectors, consumables, tools, splicers, and testers. If you opt for fusion splicing, you'll also pay a hefty fee to rent a splicer for a week. You'll pay many thousands more to purchase one.

Pre-terminated fiber also eliminates expensive waste and scraps you'll incur in the field in terms of connectors, consumables, and the cable itself.

Black Box did a study on various fiber termination scenarios comparing the estimated cost of on-site terminations versus field terminations. The result was that pre-terminated fiber can save as much as 70% in total costs over a do-it-yourself plan. Costs varied depending on whether epoxy or pre-polished connectors or fiber pigtailed were used and the level of skill needed to terminate the fiber. See Comparison Chart on page 5.

CONCLUSION

Pre-terminated fiber offers today's data center managers a lot of advantages and opportunities in terms of being able to deploy projects faster, more efficiently, and at the best price possible. Because pre-terminated fiber frees up resources, reduces labor time and cost, and guarantees proven performance, it offers IT professionals a better ROI than field terminated fiber.

If you're considering a pre-terminated fiber deployment, consider Black Box. We can offer you free 24/7 tech support and application engineering to help you plan and get the exact cable you need. In addition, Black Box guarantees the performance of our pre-terminated cable.

Need a quick quote? Go to Black Box's online configurator to design your cable and get a quote. For more information, visit BlackBox.com/PreTermFiber.

Need it fast? Black Box offers quick turnarounds, usually in a week or less.



FIELD TERMINATIONS VS. PRE-TERMINATED COST COMPARISON*			
12-STRAND OM3 (OFNP) CABLE, 250-FT. LC/LC			
USING EPOXY CONNECTORS	QUANTITY	MATERIALS	COST
BULK FIBER CABLE	250 FEET	\$437.50	\$437.50
EPOXY LC CONNECTORS	24	\$1.50 EACH CHECK	\$36.00
LABOR TO TERMINATE CABLE (15 MINUTES/CONNECTOR)	24	\$21.00/CONNECTOR	\$504.00
			\$977.50
USING PRE-POLISHED CONNECTORS	QUANTITY	MATERIALS	COST
BULK FIBER CABLE	250 FEET	\$437.50	\$437.50
PRE-POLISHED LC CONNECTORS	24	\$23.55 EACH	\$565.20
LABOR TO TERMINATE CABLE (5 MINUTES/CONNECTOR)	24	\$8.00/CONNECTOR	\$192.00
			\$1194.70
USING FIBER PIGTAILS	QUANTITY	MATERIALS	COST
BULK FIBER CABLE	250 FEET	\$437.50	\$437.50
PRE-TERMINATED 12-STRAND PIGTAILS	2	\$59.00 EACH	\$222.20
LABOR TO FUSION SPLICE PIGTAILS (4 MINUTES/CONNECTOR)**	24	\$5.60/CONNECTOR	\$734.40
			\$1394.10
BLACK BOX FACTORY TERMINATED	QUANTITY	MATERIALS	COST
PRE-TERMINATED 12-STRAND LC/LC CABLE			\$397.00

*All estimates include labor to terminate and pull cable. Material costs (cable, connectors, etc.) based on Black Box materials.

**Fusion splicer rental is estimated at \$600/week.

DISTANCE AND SPEED BY FIBER TYPE				
	1-GbE METERS @ 850 NM	1-GbE METERS @ 1300 NM	10-GbE METERS @ 850 NM	10-GbE METERS @ 1300 NM
OM1 62.5-µm MULTIMODE	300	550	33	NA
OM2 50-µm MULTIMODE	750	600	82	NA
OM3 LO 50-µm MULTIMODE	1000	600	300	NA
OM4 LO 50-µm MULTIMODE	1000	600	550	NA
	1-GbE METERS @ 1310 NM	1-GbE METERS @ 1550 NM	10-GbE METERS @ 1310 NM	10-GbE METERS @ 1550 NM
OS2 LO 9-µm SINGLE-MODE	5000	NA	10,000	40,000



