

Emergency Restoration for OSP Optical Fiber Cable

AEN 54, Rev 3

Introduction

Regardless of how well an outside plant optical fiber cable is installed, at some point it could be involved in a catastrophic accident. Buried cables can be cut by earth-moving equipment and aerial cables can have trees fall on them. No cable is completely safe. Once an accident happens, there are two major problems: restoring service to the cable and doing it quickly to minimize the impact on customers.

With unlimited resources, it is always possible to locate the perfect replacement cable and splice it in using existing splice points. However, that is rarely the case. In most instances, the damaged portion of cable must be cut out and a short length of replacement cable spliced in using optical fiber splice closures to protect the two new splice points. This provides quick and reliable restoration to the network.

General information on emergency restoration needs

The ideal solution would be to stock replacement cables of every fiber count that is installed in the network, along with all of the necessary hardware to install them. However, few companies can justify the necessary investment to hold items in reserve in the event of an accident. The best approach is to have a realistic response plan in place. Only a few items are needed to construct an effective emergency restoration kit (ERK).

A well stocked ERK will contain all the necessary tools, supplies, and consumables to repair a cable break. Choose items that will provide flexibility and that are easy to use. Many companies are often able to find every necessary item within their own stock. The cable should be similar in design to other cables already installed and should contain enough fibers that it can be used almost anywhere in the network. The same idea pertains to splice closures. The closures should have enough splicing capacity to accommodate the emergency cable. This allows maximum flexibility without having to stock a large number of items.

A large amount of the time required for a splice point is taken up by stripping and cleaning the optical fiber cable and loading the cable and fibers into the splice closure. Most of this work can be performed in advance. An effective emergency restoration kit will have both ends of the emergency cable stripped, cleaned, and loaded into the splice closure. The individual fibers will also be cleaned and loaded into the splice trays. By having this prepared in advance, the emergency restoration can be completed significantly faster with less work to be performed in the field.

Emergency Restoration Process

Situation:

A cable has been completely cut in two by a backhoe at a construction site. It has been cut roughly in the middle of a 5000 foot run and there are no splice points nearby.

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Emergency Restoration Kit Contents:

Optical fiber splice closures	→	2
Restoration cable	→	At least 200 feet
Splice trays (fusion or mechanical splices)	→	Dependent upon fiber count and splice closure
Mechanical splices or fusion splice protectors	→	1 per fiber

Equipment needed:

Cable Preparation Tool Kit
Mechanical Splicing Tool Kit **or** Optical Fiber Fusion Splicer
OTDR

General Process:

1. Locate and access the cable break.
2. Remove at least 10 m (32 ft) of cable on either side of the cut and use an OTDR to test the remaining lengths to verify that they are undamaged.
3. Strip and load cable ends into splice closures. (To save time, the restoration cable should already be stripped and loaded into the restoration closures.)
4. Splice fibers together. Mechanical splicing can be used when immediate service is critical and the system can be taken down later for fusion splicing. (To save time, mechanical splices should already be loaded into splice trays with the fibers from the restoration cable stripped, cleaned, cleaved, and inserted into the mechanical splice.)
5. Check system alarms or test with OTDR before completely sealing the closures. Test complete system after final deployment of the cable to be certain that the cable was not damaged during installation.

Summary

To conclude, the best way to be prepared for the emergency restoration of an outside plant cable is to have a response plan in place like the one above. You should verify the availability of each of the necessary items. Maintain stock items that are capable of handling the highest fiber count that might be encountered in the field. Many companies will have most of the necessary items readily available including some short lengths of cable left over from previous jobs.

Do as much work as possible in advance, such as having the restoration cable stripped on both ends, and loaded into the restoration closures. Fibers should also be cleaned and loaded into splice trays.

If you do not own your own test and fusion splicing equipment, have a plan ready for action; either rent the equipment or hire a subcontractor who has that type of equipment. Some contractors offer 24 hour emergency service. By being prepared, having a plan ready for action and keeping supplies on hand, cable restoration emergencies can be rapidly resolved.

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