Striking a Match

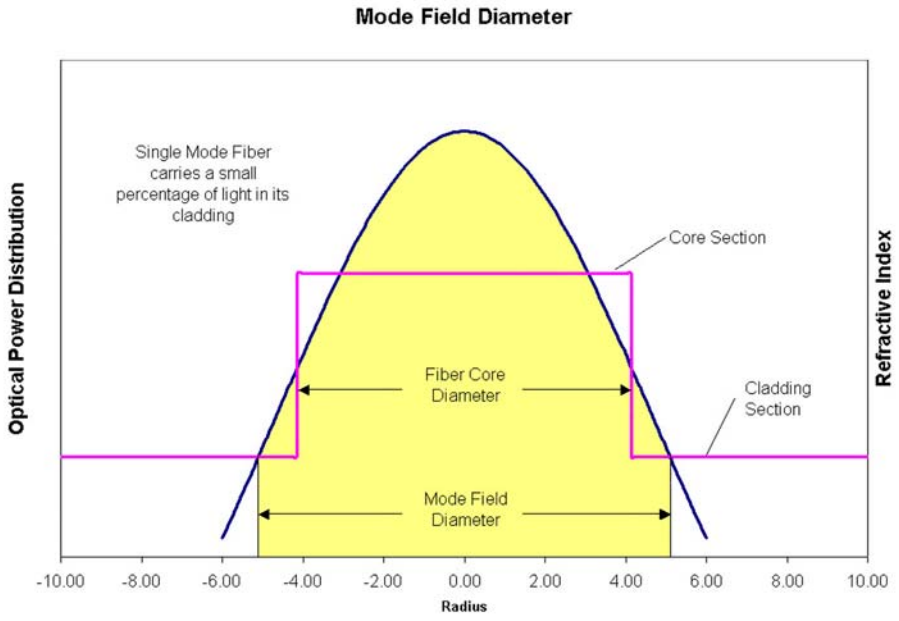
When the time comes to expand an existing fiber network, the network designer's first priority is to ensure that the new single-mode, backbone portion of the fiber network - with increased capacity - will perform at the same or better level as the legacy network.

The first necessary ingredient to a successful network expansion is a good fiber match, which will enable skilled technicians to make the best splices possible. The better the splice, the less loss at that splice point and the better overall network performance. But what constitutes a good fiber match?

Surprisingly, it's not the same manufacturer or even the same fiber ordered for the legacy network that determines a good match. More than anything else, Mode Field Diameter (MFD) is the determining factor.

Mode Field Diameter

MFD, expressed in microns, is the effective area of the core and part of the cladding through which light travels. MFD measurements can be found on product spec sheets provided by the manufacturer.



Although the nominal MFD for each fiber design is standard, fiber cannot be manufactured without slight variations in this characteristic. A variation of +/- 0.5 microns is the current industry standard (editor's note: this was as of 2002). This means any given fiber's actual MFD can vary by as much as +/- 0.5 microns from the spec sheet. For instance, matched clad singlemode fiber with an MFD of 9.2 microns could have an actual MFD of any point between 8.7 and 9.7 microns. Finding MFD measurements that are closer together will ensure a better splice.

This view of MFD as the primary indicator of a good match, however, has not always been the case. In the past, telecommunications engineers or designers have assumed that the best way to minimize splice loss when expanding a fiber network is to purchase the same fiber type from the fiber cable manufacturer that provided the legacy fiber. Intermingling of different manufacturers' fibers has not been customary.

To test the validity of this assumption, CommScope conducted comprehensive tests, matching up 20 different cables from three different designs and four manufacturers, splicing the fibers in every possible combination, measuring the splice loss from each matched pair.

The major results of the testing included:

- The better the MFD match, the better the performance of the splice
- Performance of a splice with a mismatch below 0.3 microns is equivalent to the performance of a perfectly matched MFD

To minimize splice loss, telecommunications engineers and designers should strive to match the MFD of the old and new fiber as closely as possible. Since there is an allowed tolerance, it is impractical for them to try to acquire fiber that matches perfectly. The way to ensure the best splice performance is to select not only the same fiber construction - matched clad, slightly depressed clad, or depressed clad fiber - but the fiber with the tightest MFD tolerance.

Corporate Office
1100 CommScope Place SE P.O. Box 1729
Hickory, North Carolina (USA) 28603-1729
Tel 828.459.5000 800.544.1948 Fax 828.459.5099
www.uniprisesolutions.com