



The Success of the Whole Depends on the Success of its Parts
The WaveSmart Makwa Splitter

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I know what you are thinking. What in the H. E. double hockey sticks is a Makwa? Isn't that one of those cute little critters that you aren't supposed to get wet or feed after midnight? Oh wait, that's a Mogwai. Never mind. Makwa is the name of Clearfield's new revolutionary, small form factor OSP hub. And like the bear from which it gets its moniker, the FieldSmart Makwa Hub is just as comfortable below ground as it is above. And yet, as with any new development, the success of the whole depends on the success of its parts. One key component in this new product line is the Makwa Splitter. Consistent with our simple yet innovative design methodology, Clearfield has developed a splitter offering that utilizes a 75% smaller package with smaller diameter legs resulting in 70% less cable pile up than its predecessors. But smaller packages don't necessarily equal better assemblies, and as with anything, the devil is in the details.

Mother Nature is Against You

The true test of a splitter's reliability and ultimately its worth, isn't apparent when it's 75 degrees and sunny, but rather when the mercury drops to levels that make even the most seasoned weatherman cringe. Your local physicist will tell you that when things get cold they shrink and when they get hot they expand. However, not all materials change at the same rate, and glass is one of those stubborn materials that hardly changes at all. Unfortunately however, most of the materials used in a finished splitter assembly are not glass and when they shrink, the results can be catastrophic.

PVDF or PolyVinylidene DiFluoride, is one of the most commonly used materials for furcation tubing on splitter legs because of its small coefficient of thermal expansion. It is important to realize that even though its coefficient is relatively small, it is still over 200 times more susceptible to change than the silica glass used in fiber optic cables. ($130 \times 10^{-6} \text{ K}^{-1}$ vs. $.55 \times 10^{-6} \text{ K}^{-1}$). For visualization sake, let's look at a hypothetical unjacketed splitter leg as it experiences a seasonal change from summer to winter.

On a nice, sunny 70 degree summer day, the glass fiber and the jacket are in a relaxed state and are very similar in length. (Figure 1)



Figure 1
The glass (Black) and the jacket (Red) at 70 degrees

Now as Jack Frost gets involved and the temperature swings to a bone chilling -20 degrees, both the glass fiber and the jacket undergo thermal contraction, but the jacket shrinks significantly more than the glass. The end result of this difference in contraction is that the glass is now quite a bit longer than the jacketing. (Figure 2)



Figure 2
The glass (Black) and the jacket (Red) at -20 degrees.

If care isn't taken in the design of the splitter, the longer glass fiber has nowhere to go and can easily look something like what you see in figure 3.



Figure 3

Micro-bends caused by mismatched materials under thermal contraction.

It doesn't take a lot of imagination to see that this string of micro-bends can quickly take down an entire network. They can easily result in losses of over 10dB and then escalate to added cost, late night service calls, and generally unhappy customers. Thankfully Clearfield has your back. With over 10 years of experience in fiber management, we have established ourselves as experts in the industry and mastered the art of splitter design. Our OSP splitter line is yet another example of this expertise, and has been field proven to perform in the coldest Minnesota winters as well as in the heat and humidity of a Jamaican summer. What this means to you, is that you can be confident in your choice regardless of what Mother Nature decides to throw at you.

The Bubba Factor

We've all seen examples where a contractor or installer has made a complete mess of the fiber management and splitter routing in an OSP enclosure. While it is impossible to predict every misstep that can happen, it is possible to limit the opportunities for trouble.

One way Clearfield does this is by shipping their splitters pre-parked in a removable foam parking block. When it is time to install a new splitter, the technician need only snap the parking lot into place, route the group of legs to the splitter bracket, and then slide the splitter into place. The splitter installation is tool free to minimize effort, and each splitter comes with fiber separators installed to limit the amount of tangle that can occur prior to and during installation. Clearfield then goes the extra mile by providing a clearly defined route path so there isn't any confusion when deploying a splitter leg. Clearfield believes that the easier it is for a technician to do their job, the more likely it will be performed in a clean, organized and timely manner, and this ultimately saves money.

It often seems, however, that Murphy is the authority when it comes to adding a customer or doing maintenance. It is rarely 75 degrees and sunny when a technician needs to perform their duties. While most suppliers still provide their splitters with yellow riser rated legs that become stiff and hard to work with in the cold, Clearfield took a different approach, asking "Why put indoor rated materials in a product that is intended to be used outdoors?" Clearfield instead utilizes a special outdoor rated material that not only helps control thermal expansion and contraction, but goes one step further and remains flexible at extreme temperatures down to -40 degrees. By making it easier to handle, there is less chance that the fiber will be routed incorrectly or that damage will occur during this process.

And it's versatile too....

The Makwa splitter follows in the footsteps of the Clearview Cassette by being able to offer custom configurations while using standard parts. Whether you need a 1x32, a dual 1x16, or a quad 1x8, each variety utilizes the same foot print and materials. This eliminates the need for extra splitter locations when upgrading a customer or lowering your split ratio.

This new splitter also continues to allow for a tool free installation using a patent pending snap in place mounting system. This design feature combined with the proprietary construction and superior materials, eliminates the chance of a low quality splitter sneaking its way into your network and wreaking havoc. And that is one fiber optic gremlin that we could all do without.