

Singlemode Fiber and APC Connectors

The objective of the TIA 568 Standard is to provide commercial cabling systems that will support **a variety of current and future applications**. The Z-Band RF Video Distribution System is designed to take advantage of the resulting proliferation of Singlemode Fiber in the backbone, and Category Cable in the Horizontal.

Z-Band specifies SC, Angle Polished connectors for the Singlemode Backbone and customers often ask why is Singlemode required, and why do we specify Angle Polished connectors. The basic answer is to maintain Video Signal Quality, but a more detailed explanation is depicted in Figures 1 & 2 below.

The first issue to understand is some of the terminology related to fiber optic cables:

1. A Mode is the path a photon takes in the core of the fiber
 - a. Multimode (50 micron or 62.5 micron core) supports many paths for photons to travel through the core; many paths = multiple modes resulting in the name Multimode
 - b. Since each Mode travels down a different path, the overall length traveled by each mode is different; this results in Modal Dispersion which distorts the signal and limits the distance and bandwidth of the Multimode cable. Step Index Multimode (A) had severe modal Dispersion issues and Graded Index Multimode (B) showed improvement, but was still too much for Quality Video Transmission.
2. Singlemode fiber (C) only supports one path for photons (9 micron core) and thus **Eliminates Modal Dispersion**.

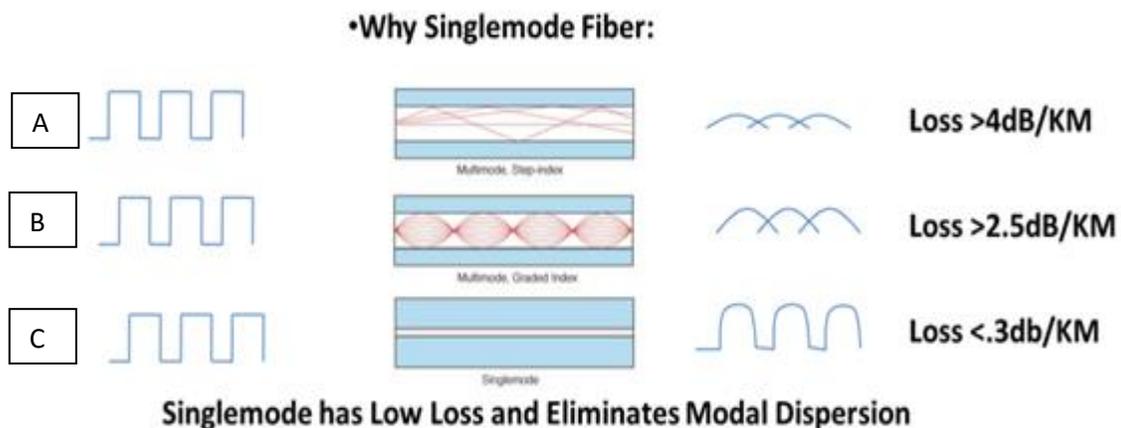


Figure 1

Singlemode Fiber has infinite Bandwidth and significantly lower loss than Multimode, ensuring the ability to support current Video requirements and any future applications such as Passive Optical Networks.

Now that we have the right fiber, let's look at the Connectors.

High Performance Singlemode connectors are available with a Physical Contact (PC) end finish which can reduce Back Reflections to -40dB, Ultra Physical Contact (UPC) reduces Back Reflections to -50dB, and Angle Polished Physical Contact (APC) which **Eliminates Back Reflections**. Back Reflection can significantly distort the signal quality, which can cause degradation of Video Signal Quality, and creates potential problems when you attempt to run next generation technology applications on your Singlemode Fiber backbone.

We can all remember when we first realized that a stick seems to bend when we stick into a still pool of water and, at the same time, we see our reflection in that pool. This is caused by the fact that when travels through air and the encounters a material with a different index of refraction (the water) some of the light bends and some of it reflects back. The critical angle for a water to air interface is 48.6 degrees; anything striking the barrier at less than 48.6 degrees will reflect, greater than 48.6 degrees will bend as it passes through the barrier. The same thing happens at a fiber cable interface. However, it has been shown that an angle of 8 degrees causes the back reflection to pass through the core to cladding barrier and will not reflect back into the core, thus providing superior back reflection elimination.

1. Figure 2 shows that Back Reflection can be substantial at a non-PC Connector interface (A).
2. PC Connectors (B) are specified to be no less than -40dB, and UPC Connectors are specified to be no less than -50dB. Some vendors state that their UPC Connectors will provide -57dB.
3. APC (C) Connectors are specified to be no less than -60dB.
 - a. The -3dB differential between the highest performance UPC and an APC connector means the UPC has **Twice the Back Reflection of an APC connector**.

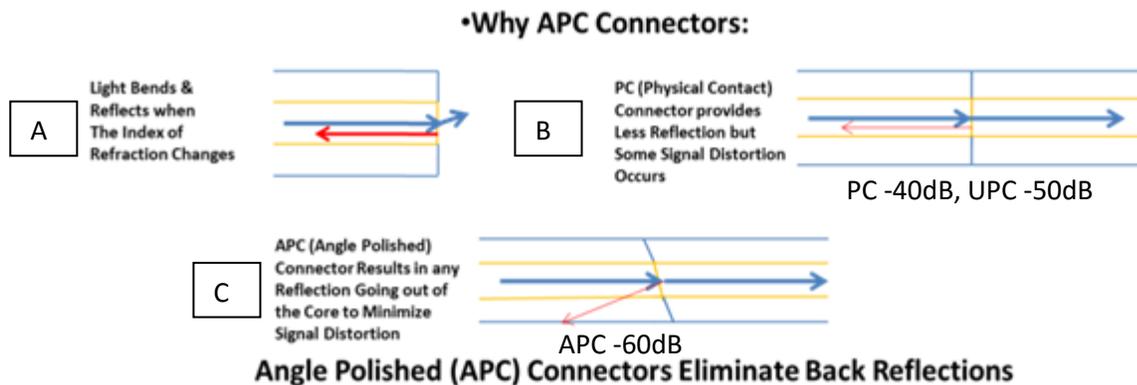


Figure 2

By installing Singlemode fiber, terminated with APC connectors, in your Building Cabling Backbone and the latest version of Category Cable in your Horizontal, you can rest assured that not only will the Z-Band RF Video Distribution System provide **Consistent, High Quality Video throughout your Building or Campus environment** but, you will also be properly cabled for tomorrow's applications.