The TC-FOA group that we need to develop an "information document" to make the audio community aware on the things that makes Fiber Optics integrate well with an audio/video system. Being that Fiber Optics has been around for decades there still exists many myths and misconceptions. Education is the key factor to make it work flawlessly. I gave an example handout of this at our meeting this past October for TC-FOA.

This example talks about now and future fiber optic cable requirements that are daunting. The title of our meeting was " What is this OM and OS stuff about anyway?".

See my handout attached.

The committee agreed that we should and collectively put an information document together and submit it to be published by the AES for all to see what designers, engineers, technicians and new users will need to be successful on deploying fiber optic technology. The information document will be concentrating on connector and cable requirements along with examples of generic fiber optic specifications. We feel this is much needed and will be more valuable as bandwidth and speed get higher and higher.

Ron Ajemian, Chair AES TC-FOA

What is all this OM and OS stuff about anyway?

Ronald G. Ajemian, Chair – AES TC-FOA
AES Technical Committee on Fiber Optics for Audio

OM & OS are fiber optic cable designation/specifications. OM is optical multimode fiber and OS is optical singlemode fiber. The numbers that follow the OM and OS are for different data rates along with wavelengths, distance and attenuation specifications. See chart 1. Optical Fiber Specifications.

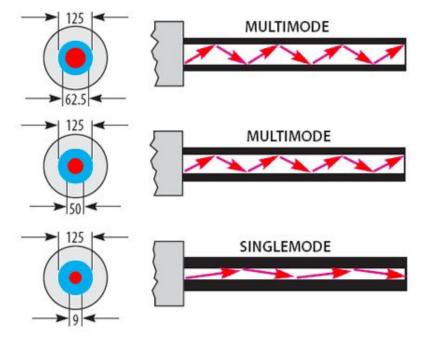What is the difference between OM1, OM2, OM3, OM4, OM5, OS1 & OS2?

CHART 1

Example: 9/125 means 9μm diameter for the core/125 μm diameter for the cladding.

OM (optical multimode fiber) and **OS** (optical singlemode fiber) designations are outlined in the ISO/IEC
11801 standard.

OM1: For optical multimode fiber with 200/500MHz*km overfilled launch (OFL) bandwidth at 850/1300nm (typically 62.5/125um fiber which is now obsolete.)

OM2: Type A1a.1 , for optical multimode fiber with 500/500MHz*km OFL bandwidth at 850/1300nm (typically 50/125um fiber)

OM3: Type A1a.2, for laser-optimized 50um fiber having 2GHz*km effective modal bandwidth (EMB, also known as laser bandwidth), designed for 10 Gb/s transmission.

OM4: Type A1a.3, for laser-optimized 50um fiber having 4.7GHz*km EMB bandwidth designed for 10 Gb/s, 40 Gb/s, and 100 Gb/s transmission.

OM3 vs OM4

OM4 fiber has been on the market since 2005, sold as premium OM3 or OM3 fiber. The OM4 designation standardizes the nomenclature across all manufacturers so that the customer has a clearer idea of the product that they are buying. OM4 is completely backwards compatible with OM3 fiber and shares the same distinctive aqua jacket. OM4 was developed specifically for VSCEL laser transmission and allows 10
Gigabits/second link distances of up to 550 Meters (compared to 300 Meters with OM3).

The effective modal bandwidth for OM4 is more than double that of OM3 (4700 MHz.km for OM4 vs 2000 MHz.km for OM3).

While OM3 fiber will still be future proof in most applications, allowing speeds of 10Gb/s up to 100Gb/s, OM4 fiber offers users longer length distances and more bandwidth for optical budgets.

OM5: For laser-optimized for 50μm fiber greater than 28GHz*km EMB bandwidth designed for 40 Gb/s, and 100 Gb/s transmission.

OS1: Optical Singlemode Fiber, 1.0 dB/km for OS1, with speeds from 1-10Gb/s at distances up to 2km. Mostly used as a tight buffer fiber for indoor use.

OS2: Optical Singlemode Fiber. The typical attenuation is 0.40 dB/km at 1310nm and 0.30 dB/km at 1550nm. At Gigabit speeds, the signal can normally travel up to 25km on this fiber (at 1310nm) and up to 80km at 1550nm. At 10Gb/s speeds the distance is a minimum of 5-10km at 1310nm and 30-40km at 1550nm. Mostly used as loose buffered fiber for outdoor use.

About the Cable Construction and the Differences
Category OS1 and Category OS2 are the two types of cable construction. Category OS1 is recommended for internal tight buffered cable construction, and Category OS2 is recommended for loose tube or blown fiber solution. The loose tube cable is made from optical fiber and gives the best installed performance of 0.4dB per km.

Category OS1 cable is designed for use in internal situations where the maximum distance is 2km. The cable type will allow speeds of over 1 to 10 Gb/s Ethernet. By contrast, category OS2 cable is designed for maximum distance of 5km to 10km.

Note: OS1 and OS2 are standard singlemode optical fiber used with wavelengths 1310 nm and 1550 nm (size 9/125 μm) with a maximum attenuation of 1 dB/km (OS1) and 0.4 dB/km (OS2). OS1 is defined in ISO/IEC 11801, and OS2 is defined in ISO/IEC 24702.