

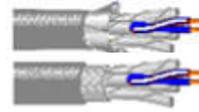
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## HCS White Paper

### **Proper selection of CAT6A Modular Cords: F/FTP vs S/FTP**

**F/FTP:** Aluminum foil shield over foil shielded pairs

**S/FTP:** Copper braid shield over foil shielded pairs



#### **Abstract:**

*In many cases modular cords are regarded as an insignificant and expendable component of the LAN structured cabling system, thus system integrators are merely looking for the cheapest cords they can find. As a result, when CAT6A shielded cabling systems are specified, the cords of choice may have F/FTP design, downgrading significantly the performance of the cabling.*

*This paper explains what are the risks and pitfalls using such subpar modular cords.*

Shielded CAT6A modular cords are an integral part of the channel, and any deficiency in their design will have a negative impact on the performance of the network.

The function of the copper braid used in S/FTP cords is critically important:

- ✓ Collect efficiently all the EMI accumulated on the individual pair foil shields and drain them safely to the ground, providing high coupling attenuation. The low DC resistance of the combined shield has a low DC resistance, providing low transfer impedance.
- ✓ Ensure low contact resistance to the connecting hardware.
- ✓ Hold the 4 individual foils tightly closed, providing stable impedance, high return loss and good TCL (balance).
- ✓ Maintain cable flexibility and enabling low bend radii without breaking.
- ✓ The highly efficient shield ensures a very high Alien Crosstalk Loss (AXT).

As in total contrast, F/FTP cords cannot provide any of the above benefits:

- The overall aluminum foil cannot be used as a contact to the ground hence all collected EMI has to be grounded with a single, thin drain wire, which has a very questionable contact with the foils and cause a high DC resistance of the shield.  
This result in relatively low coupling attenuation and high transfer impedance.
- The same drain wire is the only contact to the connecting hardware, so the contact resistance is high, and it cannot ground efficiently all the EMI.
- The overall foil cannot hold the individual foils tightly, so small openings are created each time the cord is manipulated (as often happens in modular cords during normal use), causing unstable NEXT, low return-loss and poor balance.
- The overall foil causes the cable to be stiff and it may easily crack during normal use, reducing furthermore the coupling attenuation and the Alien Crosstalk Loss.



## **Discussion**

The horizontal cable is indeed the major components in the channel, but each bite of information has also to pass the pairs inside the cords, so these pairs must support the signals exactly as done by the horizontal cable, and any malfunction of the cords will affect the entire network.

As shown above, the cable design of CAT6A modular cords has a substantial effect on all the main transmission properties and the shielding efficiency: S/FTP construction is the only design ensuring good and stable performance, while F/FTP cords cannot ensure anything.

S/FTP cords will support IEEE 802.3 10GBASE-T (operation at up to 400MHz) smoothly and safely, while F/FTP cords may be seriously affected by EMI.

EMI may be negligible when 1GBASE-T is running (up to ~80MHz), but when running 10GBASE-T, operating at ~400MHz, these EMI become critical.

In simple words: F/FTP cord cannot ensure reasonable support of 10GBASE-T.

The network will work, but the NICs may default to 1GBASE-T, due to excessive BER.

On the other hand, in S/FTP cords the overall copper braid shield, having a low DC resistance and surrounding the cable core in 360°, can collect efficiently all the EMI noises accumulated on all 4 foils, grounding them safely without increasing the BER and keeping the full network data-rate.

Frankly speaking, this discussion is redundant, as all the above facts are well known in the industry, so CAT6A F/FTP cords are hardly used anywhere, and very few vendors have them.

**So, now that all the facts are clear and well known, the only mystery that remains is why anyone would prefer the use of CAT6A F/FTP cords over CAT6A S/FTP cords.**

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