Why use specialist Ethernet cables for audio and what makes Atlas streaming cables special?

The Ethernet specification is defined by the OSI 7-layer model, which standardises the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology. Within this model, the cable is part of the 'Physical' layer, the lowest level in the hierarchy, while the six layers above deal with packet switching, error correction, timing, 'end to end' transmission, etc.

Ethernet cable specifications are further defined by the bandwidth requirements of the system - Cat5, Cat6, Cat6A etc., all of which are tightly specified to be able to deliver a guaranteed bandwidth. The wider the bandwidth of the cable, theoretically the easier it should be to extract the data

1] The conductor.

Tough pitch copper, copper-clad aluminium, and OFC (Oxygen Free Copper) can all be used to produce data equivalent Cat-x cables.

Typically, Ethernet data cables use solid conductors for 'in-wall' applications and where data needs to be transmitted over long distances, whilst data 'patch chords' typically use stranded conductors for optimum flexibility.

Atlas chooses solid core OFC for audio applications for optimum performance, as they suffer less from inter-strand distortion and capacitive variation.

2] The dielectric.

The more efficient the dielectric the more bandwidth potential the cable will have, of course this is balanced out in the 'real' world by cost factors, which leads producers to use inferior less-compliant materials that don't crush' as they are being twisted and wound.

Atlas use Polyethylene and foamed Polyethylene to produce our streaming Ethernet cables, experience gained developing our USB and HD video products showing these are stable wide-band materials that guarantee great audio results. The key is precise control in

manufacturing so that the balance between tight twist ratios and symmetrical twist patterns are maintained.

3] The screening.

Data cable manufacturers have focused on the humble twisted pair to drive data speed and bandwidth forward. With its inherent common mode rejection properties, it's a cheap method of production, so a winner in the data field for years.

However, as you push the bandwidth of the twisted pair you soon get to a point where further twisting offers no more benefit - at which point you need to add cable screening to enhance rejection performance.

As the bandwidth requirement of the cable increases so does the shielding required to deliver the specified performance, specified as:

- U/UTP - Unscreened / Universal Twisted Pair

- U/FTP - Unscreened / Foiled Twisted Pair

- S/FTP - Screened / Foiled Twisted Pair

Atlas uniquely has an external grounding system used on our Mavros products called Grun.
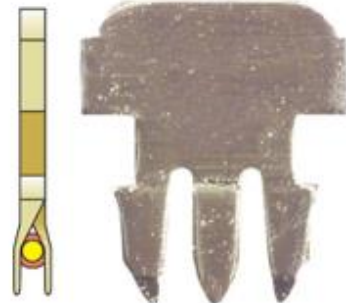
4] The plugs.

A plug is a plug is a plug? No. Again, what's acceptable for a low-cost cable for data is quite different from the standards required for high-resolution audio. At Atlas we use screened triple pin contacts for our Cat 6 and Cat7 cables. This eliminates conductor displacement, improves registration and conductivity.

Connections:

Double Contact   Triple Contact   Pierce (stranded only)

We use very stable polycarbonate shielded plugs with robust gold plating up to 10 times the 'Industry norm', even on our entry level products. These plugs have inherent pin stability which is a requirement if the cable assembly is to pass international compliance standards.

Our Mavros streaming cable utilise precision- Zinc Die cast connectors for the highest quality connection. These connectors also have precision pin alignment optimised for multiple secure insertions.

5] The assembly process.

In the bulk data cabling world, a cable of 'bandwidth X' is typically mated with a mis-matched plug of 'bandwidth Y,' often using uncalibrated hand tools, which frequently over-crimp the plugs (applying uneven crimping pressure applied across all eight pins), resulting in inconsistent product to product performance.

These cables typically fail ISO/TIA certification standards. Even a fully tested and bandwidth guaranteed Cat6 cable terminated with a Cat5 plug will only deliver Cat5 performance.

Atlas cables are hand-assembled using our precision-calibrated 'triple prong' insulation displacement connection method - we made our own tool for the job - for consistent, effective piercing of the dielectric & conductor bonding and to accurately control the plug contact height.

In the above picture pins 1,2,7 and 8 are lower than pins 3,4,5,6 leading to reduced bandwidth. Atlas eliminates this common error introduced by simple hand crimping tools by using dedicated production auto alignment tooling.

The audible benefits are that the timing, accuracy and bandwidth of the customers system are all improved and as the musicality of the system has taken a step forward then this opens the possibility to broaden musical taste and listening pleasure.

Are Cat6A or 6 cables better products for audio than a Cat5e product etc?

All else being equal, the wider the bandwidth of the cable, the easier it should be to extract the data. However all the factors discussed above come into play, so a cable using high quality components and precision manufacturing to certified standards will typically outperform a less carefully manufactured item of nominally higher spec.

Grun on an Ethernet cable? How does this work?

As stated above, the bandwidth requirement of the cable increases so does the shielding required to deliver the performance. However, when you plug the shielded cable into your system, the screens are typically connected at each end, and the ground current drain path is defined by the equipment. In the audio world we all know that this is an undefined path, if you can make this drain path more predictable across the system, you gain the potential for better sound quality.

The Grun connection allows any RFI/EMI conducted in the cable's outer screen to be drained to earth in a defined and predictable way via a Grun ground cable and adapter, generally attached to the equipment's ground terminal or chassis.

Performance can typically be raised further using an optional Grun power adapter which provides for connection of up to four Grun cables to an unused mains socket or via a power management device such as Eos Modular 2.5em/4.0em.

See our Grun page for further information.