

# Technical Information

## Is there any reason to install Category 7/7a ?

### Background

There was a time when in the USA and UK it was deemed 'not possible' to get 10G ethernet over copper cabling at a 100m channel.

Whilst opinion was changing, the european manufacturers 'stole a march' and produced a new category of copper cabling classified as an S/FTP cable. This means that it has foil twisted pairs with an overall screen/braid. This cable was designed initially for 10G (before the standard) and was designed to operate up to 600Mhz. This cabling system was ratified as Cat 7 (class F).

At those frequencies, it was proven to be 'not possible' to get a 90m permanent link (100m channel) working using a shielded type of RJ45 and so three alternate (non RJ45) connectors were ratified, a GG45 from Nexans which has a level of backwards compatibility with RJ45 , a Tera connector from Siemon (which is not backwards compatible) and a lesser known AJ45 connector from Stewart. This Cat 7 system was fully ratified by ISO in 2002 and is used predominantly in central Europe (Switzerland,Germany,Austria,parts of France etc).

A 'similar' system was created which was subsequently classified as Category 7a. This cable has a similar cable construction to Category 7, uses the same optional connectors (to be classed as a system) is designed to operate at up to 1000Mhz and originally was 'hoped' would cater for 25 and 40GbaseT systems.

These cabling systems in the LAN environment are both ratified to support 10G but will not support the next ethernet speed of 25G or 40G at a 100m channel. There are no developments within the current standards groups to look at 25 or 40G over twisted pair copper at a 100m channel.

In the USA, once they realised that 10G was possible over copper (based on new encoding techniques), a new cabling system was created and subsequently classified as Category 6a (Class Ea). This cabling system supports 10G ethernet at 500Mhz and due to the lower frequency requirements (in part) enabled the 100m channel to work using the industry recognised/tried and tested RJ45 connector. Originally an unshielded version was deployed but due to initial 'alien crosstalk' issues most manufacturers/installers supply some element of shielding such as U/FTP, F/UTP, F/FTP etc. The element of shielding eliminates alien crosstalk and works perfectly with shielded RJ45's.

In the USA/UK,Netherlands,Australia etc, a Cat 6a system is therefore the way to support 10G at a 100m channel rather than the central european option of Cat 7 or Cat 7a.

### Advantages/Disadvantages

- 1 Although some european manufacturers would like to think otherwise, it has been proven that Cat 7/7a will not support LAN speeds above 10G on a 100m channel, therefore, there is no tangible reason to install it over Category 6a in a structured cabling environment. Certainly, there are no further ISO standards to investigate 25G or 40G at 100m channel lengths. 25G and 40G are supported at Category 8 but at limited channels of 30m maximum.
- 2 Because a 'true' Cat 7 system has GG45,Tera or AJ45 connectors then issues arise when connecting the cabling system to active equipment. Firstly, so far as I am aware, there is no active equipment that has GG45 or Tera connectors inbuilt into them , nor indeed any plans to have such. Therefore, with a GG45 system, yes, you could install a Cat 6a RJ45 lead from the cabling system to equipment, but you are then straight away 'downgrading' the connection from a Cat 7 to Cat 6a link (as RJ45 is not available on Cat 7). Therefore, why not just install a Cat 6a system anyway (Cat 6a F/FTP being the better option) ?
- 3 The Cat 7/7a cable is more expensive than Cat 6a.
- 4 The GG45 connectors are significantly more expensive than the Cat 6a RJ45's
- 5 The Cat 7 cable generally has a larger outside diameter which affects containment calculations.
- 6 Testing a Cat 7/7a system is more expensive. With the latest Fluke DSX 8000 for example, if Tera connectors are used then a set of additional test leads can be bought for around £1,000 from Fluke. If GG45 are used, then adaptor leads need to be bought directly from Nexans with cords for around half the Tera price, still a significant additional cost. Of course, Cat 6a can be tested with the leads that come with the tester. A similar set up can be done with the previously model DTX 1800 (not 1200).
- 7 Cat 7/7a are not ratified standards in TIA/EIA so if a client asks for compliance to this standard, Cat 7/7a cannot be selected as an option.

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### Conclusion

Cat 7 (and Cat 7a) are used in central Europe (and for companies 'head office'd' in central Europe) to deliver 10G solutions, due to the 'historical reasons' of that geographical region preferring fully shielded solutions.

10G is delivered in the USA/UK etc via Cat 6a as it was developed around the RJ45 connectivity solutions.

Some 'end users' have took the view to install Cat 7/7a cable and put Cat 6a connectors on the end in a structured cabling environment, in my opinion, this is a complete waste of time (with regards network performance) for the reasons mentioned above.

Connectix can of course supply and warrant Cat 7 or Cat 7a solutions but from an operational point of view they provide no advantage in the LAN environment.

Arguably, in an AV deployment, Cat 7a has an advantage of supporting CATV signals at 862 Mhz (Cat 7a is a 1000Mhz system but still will only support 10G in a LAN environment).

It seems therefore to be a hard argument to pay the extra costs for an end to end Cat 7/7a system over a Cat 6a system (U/FTP or F/FTP) or indeed to install Cat 7/7a cable with Cat 6a shielded RJ45 connectors for no technical benefit in a structured cabling environment.