

Category 6, Category 6e & Category 6a

Technical Information

There are numerous options for deploying ethernet via copper cabling in the 'horizontal' cabling elements of a building/campus. Currently, the common ones are Category 6 and Category 6a in the UK and North America and Category 7 and Category 7a in Central Europe.

Category 5e, although still deployed, falls outside of the TIA, ISO and EN standards now with Category 6 being the minimum 'standards compliant' cabling system. We also have Category 8.1 and Category 8.2 for shorter (30m) distances within data centres.

Category 5e was designed to cater for gigabit ethernet originally. Category 6 was designed to not only cater for gigabit ethernet but also for (at the time) 'future' technologies, that however did not 'play out'.

The Europeans were the first to design and introduce a cabling system to cater for 10GbaseT or 10 gigabit ethernet over copper. These Category 7 and 7a systems are fully shielded and are not recognised in the TIA standards but are in the ISO and EN standards (international/European). These systems do not use RJ45 connectivity.

In the early years when the Europeans were developing their Category 7 and 7a systems, manufacturers in the USA were looking to 'enhance' Category 6 systems and the term appeared Category 6e (enhanced). It was thought/hoped that this cable/system would be the UK/North American version to cater for 10GbaseT. It has to be noted that although not widely known/remembered, Category 7 was a recognised ISO and EN standard well before Category 6a was developed and subsequently ratified.

Category 6e was 'marketed' as being able to work at between 350 and 550 Mhz (depending on manufacturer) and Category 6 works at 250 Mhz.

This is all well and good but Category 6a then came on the scene operating at 500Mhz, the difference being that all of the standards bodies (TIA, ISO and EN) developed and encompassed Category 6a as a 'ratified' cabling standard. It is an 'end-to-end' system designed with 10GbaseT in mind including all of the necessary RJ45 components.

Category 6e does not exist as a standard therefore, nor is there any work being developed on making it a standard and so any mention of higher bandwidth capability has no meaning/advantage, you will not see Category 6e components being marketed and no-one will issue a Category 6e performance warranty (as there isn't a standard to benchmark against).

There are network switches available now that will also support 2.5GbaseT and 5GbaseT, in the right scenario Category 6 and even Category 5e will support those ethernet standards.

For guarantees of support and also for 10GbaseT (which the aforementioned cannot support on a 100m channel) then Category 6a is the only RJ45 based cabling system to choose.

There is no point therefore in choosing a Category 6e cable as there is no advantage to do so and in fact only disadvantages (such as no standards compliancy, no components and no warranty available).

Moving onto wireless and in particular Wifi 6. There is already a talk of Wifi 6E. This is relevant as the initial Wifi 6 deployments will be utilising 1G, 2.5G and then 5G on a single port. When the Wifi 6E is ratified it is envisaged that 10G and dual ports will also come to fruition. We will therefore have Wifi access points with 2 ports for aggregation each capable of having 10G.

Both the TIA and ISO recommend therefore when cabling for Wifi access points that 2 x Category 6a cables are deployed now, even if the rest of the cabling is Category 6 or lower.

The choice for cabling should therefore be either Category 6 or Category 6a, Category 6e has no 'useful' place.

We have identified ten advantages of deploying a Category 6A cabling system over a Category 6 system for reference:

1. Category 6a will support 10GbaseT up to a full channel length of 100m
2. It is truly future proofed, will not be superseded in the horizontal
3. It has enhanced performance for PoE in regards to heat dissipation due to the foil surrounding the pairs (full 100w at 100m)
4. As indicated, has better support for wireless (inc full 802.11ax 10G)(Wifi 6)
5. Eliminates EMI/RFI
6. Has an improved return loss of at least 3db over Cat 6
7. Will support next generation 4k and 8k CCTV resolutions
8. Will support 1GbaseT at an extended channel distance of 120m thus enabling over distance links
9. Category 6a has more 'headroom' than Category 6 and so even at 1G network speeds the cabling system has its advantages
10. Category 6a is 'backwards compatible' and so Category 6 patch cords can be utilised initially until such time as a full 10GbaseT solution (or links) is required

