CATEGORY COPPER CABLING

There's been a lot published recently about the possibilities of 40Gb/s and 100Gb/s over copper – but before we all get carried away with the 'next exciting thing', Brand-Rex Chief Technology Officer Ken Hodge provides an overview of the state of 'real and available now' copper cabling technologies – what they're good for and if the writing is on the wall for any of them.

Cat 1 – 5

Categories 1 to 5 are all dead and buried as far as new installations are concerned. Memories of a bygone era.

Cat 5e

But Category 5e, the upgrade which occurred to Cat 5 to make it Gigabit Ethernet capable has now been with us since 1992. Surely it is time to pension it off?

Absolutely not!

Cat 5e or Class D is still the technology of choice for thousands of smaller local area networks (LAN) where, during the network's lifetime, there is no likely need for greater than 1Gb/s. And, to be honest, in many offices and small companies, 100Mb/s is still perfectly adequate and will be for some years.

Cat 5e is also a great commercial choice for short-term networks where, for example, a company cables-up a temporary or short term rented building - knowing that they only need the network for two or three years and then they're moving out. So, for them, there's no commercial sense in future proofing that network.

As for Cat 5e unshielded (UTP) versus shielded, it remains very much a matter of personal preference. It's really only in areas of high electrical noise that shielded Cat 5e become technically superior.

Cat 6

Strictly speaking, Cat 6 has never had an application (such as a specific speed of Ethernet, ATM etc.) of its own. Instead, it became a significantly better solution for Gigabit Ethernet - offering the safety margin of 'headroom' that Cat 5e lacks.

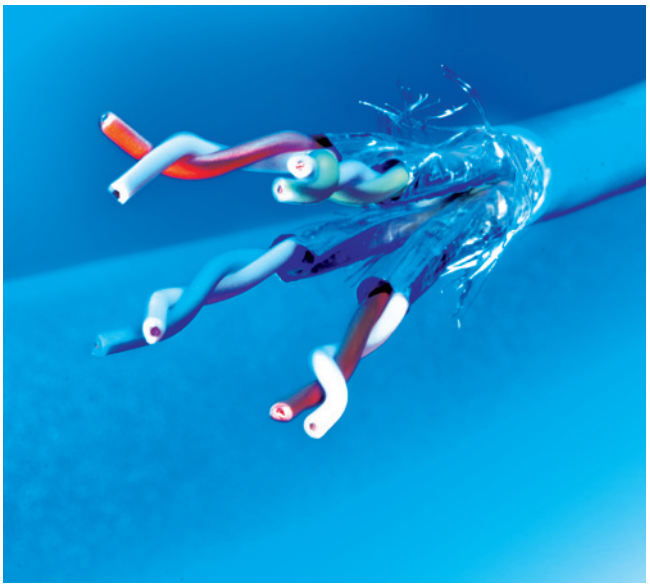
With thicker conductors, Cat 6 is also better for power over Ethernet (PoE) applications where its cables do not get as hot. (And it should always be remembered that when data cables get warm it significantly degrades their data performance and the length of channel that can be supported!).

So, for installations where Gigabit is going to suffice for all foreseeable business or operational requirements (and where reliability rather than cheapness is the main driver) Cat 6 UTP or shielded (depending on local preferences) is only a little more expensive than Cat 5e but gives a much more robust engineering solution.

In the data centre, some people are still installing Cat 6 though the logic of this, with Cat 6 having no future proofing past 1Gb/s and the standards recommending a minimum of Cat 6A / Class EA, has to be questioned.

Cat 6A

It seems an age ago that 10 Gigabit/s cabling systems were first being designed - 2003 in fact. And now in 2012, almost a decade later with Intel's on-motherboard chipset just launched, 10Gb/s Ethernet electronics are finally about to become mainstream.



Already hundreds of millions of kilometres of Cat 6A and Class EA cabling systems have been deployed by forward-looking risk-hedging enterprises in both the backbone and the horizontal.

In enterprise backbones with links of 100m or less, 10Gb/s Ethernet is ideal with the cost of copper NICs (Network Interface Cards) about to become a fraction of those for fibre.

10GbE will undoubtedly become the network interface of choice for PC manufacturers – which means that Cat 6A should be the cabling system of choice for the majority of enterprise.

In the data centre, short-reach (15m) 10Gb/s Ethernet over twinax cabling was first to market - but now that 10GBASE-T has cheap electronics becoming available the Cat 6A solution – costing a couple of £s per link compared to £100 or more plus per twinax-based patch cord - will quickly make the short-reach solution obsolescent.

The key data centre standards – European EN 51073-5, ISO/IEC 24764 and American TIA 942A all recommend Cat 6A or Class EA as the minimum standard now for data centres.

The question of 'shielded or unshielded' for Cat 6A has been a debate for years. With the Cat 6A UTP cables being, for the first time, just as complex in their design and manufacture as shielded products, market forces seem to be showing that shielded is the predominant choice even in historically UTP-centric markets like the UK and USA.

Cat 7

Cat 7 cables have been deployed in high volume around the world – though notably not in the UK or USA.

Like Cat 6, Cat 7 never had an Ethernet – nor indeed any other application - to call its own; not even analogue video. Perhaps its main justification was 'cable-sharing' the ability to use two-pairs for data and the spare two pairs for two single pair applications like analogue voice or fax.

But since 1000BASE-T Ethernet arrived needing all four pairs (and two-pair 1000BASE-TX didn't gain any market traction); pair-sharing ceased to be a logical argument many years ago and cable sharing is really a museum-technology now.

Of course Cat 7 can happily run 10Gb/s Ethernet but, since virtually all equipment is Cat 6/6A RJ-45 based, it needs to convert to these connections at the ends of the link - which reduces the link to Cat 6 or Cat 6A based on the component of lowest performance.

So Cat 7 is effectively obsolete.

Cat 7A

With Cat 6A actually doing everything technologically that Cat 7 was proposed for, those companies heavily involved increased its frequency range from 600MHz to 1000MHz claiming a new level of 'future proofing'.

As of today, the fastest available Ethernet protocol is 10GBASE-T which needs only 500MHz and there is only a slim possibility that existing Cat 7A components will actually support 40 Gb/s or 100 Gb/s.

Cat 7 and Cat 7A also spawned some new non RJ-45 connectors. The ISO/IEC 61076-3-104 square connector - but as this is thicker than the latest laptops that pretty much rules it out from deployment on mass market user equipment: - and the ISO/IEC 60603-7-71 which combines a standard flat 4-pair RJ-45 interface with a switching mechanism for backwards compatibility to Cat 6 and Cat 6A and a 'one pair in each corner' interface for Cat 7A. Both were originally intended for other higher frequency applications, that haven't as yet emerged.

Can my existing cabling support 40G?

The only honest answer is no-one knows.

For Cat 6A it's pretty unlikely, likewise for Cat 7. Cat 7A is a slim possibility – but it's more likely to be a revised Cat 7A (more of a Cat 7AA or Cat 8 perhaps) at 1200MHz instead of the current 1000MHz or perhaps new cabling at an even higher 1600MHz. So again it's maybe or maybe not.

Our own modelling, developed together with DeMontfort University, using Technology Forecasting Techniques indicates that a 2000MHz cable frequency could actually prove to be needed.

It's going to be quite a bumpy ride while all of these options are fought out – if and when the IEEE study group is formed and starts its work.

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