

Category 6 Cabling System and Application Questions

Why do I need all the bandwidth of category 6? As far as I know, there is no application today that requires 200 MHz of bandwidth?

Bandwidth precedes data rates just as highways come before traffic. Doubling the bandwidth is like adding twice the number of lanes on a highway. The trends of the past and the predictions for the future indicate that data rates have been doubling every 18 months. Current applications running at 1 Gb/s are really pushing the limits of category 5e cabling. As streaming media applications such as video and multi-media become commonplace, the demands for faster data rates will increase and spawn new applications that will benefit from the higher bandwidth offered by category 6. This is exactly what happened in the early 90's when the higher bandwidth of category 5 cabling compared to category 3 caused most LAN applications to choose the better media to allow simpler, cost effective, higher speed LAN applications, such as 100BaseTX.

Note: Bandwidth is defined as the highest frequency up to which positive power sum ACR is greater than 0.

What is the general difference between category 5e and category 6?

The general difference between category 5e and category 6 is in the transmission performance, and extension of the available bandwidth from 100 MHz for category 5e to 200 MHz for category 6. This includes better insertion loss, near-end-crosstalk (NEXT), return loss, and equal level far end crosstalk (ELFEXT). These improvements provide a higher signal to noise ratio allowing higher reliability for current applications and higher data rates for future applications.

Will category 6 supersede category 5e?

Yes, analyst predictions and independent polls indicate that 80 to 90 % of all new installations will be cabled with category 6. The fact that category 6 link and channel requirements are backward compatible to category 5e makes it very easy for customers to choose category 6 and supersede category 5e in their networks. Applications that worked over category 5e will work over category 6.

What does category 6 do for my current network vs. category 5e?

Because of its improved transmission performance and superior immunity from external noise, systems operating over category 6 cabling will have fewer errors vs. category 5e for current applications. This means fewer re-transmissions of lost or corrupted data packets, under certain conditions, which translates into higher reliability for category 6 networks compared to category 5e networks.

When should I recommend or install category 6 versus category 5e?

From a future proofing perspective, it is always better to install the best cabling available. This is because it is so difficult to replace cabling inside walls, in ducts under floors and other difficult to access places. The rationale is that cabling will last at least 10 years and will support at least 4 to 5 generations of equipment during that time. If future equipment running at much higher data rates requires better cabling, it will be very expensive to pull out category 5e cabling at a later time to install category 6 cabling. So why not do it for a premium of about 20% over category 5e on an installed basis?

What is the shortest link that the standard will allow?

There is no short length limit. The standard is intended to work for all lengths up to 100 meters. There is a guideline in ANSI/TIA/EIA-568-B.1 that says that the consolidation point should be located at least 15 m away from the telecommunications room to reduce the effect of connectors in close proximity. This recommendation is based upon worst case performance calculations for short links with 4 mated connections in the channel.

What is a “tuned” system between cable and hardware? Is this really needed if product meets the standard?

The word “tuned” has been used by several manufacturers to describe products that deliver headroom to the category 6 standard. This is outside the scope of the category 6 standard. The component requirements of the standard have been carefully designed and analyzed to assure channel compliance and electrical/ mechanical interoperability.

What is impedance matching between cable and hardware? Is this really needed if product meets the standard?

The standard has no impedance matching requirements. These are addressed by having return loss requirements for cables, connectors, and patch cords.

Is there a use for category 6 in the residential market?

Yes, category 6 will be very effective in the residential market to support higher internet access speeds while facilitating the more stringent Class B EMC requirements. The better balance of category 6 will make it easier to meet the residential EMC requirements compared to category 5e cabling. Also, the growth of streaming media applications to the home will increase the need for higher data rates which are supported more easily and efficiently by category 6 cabling.

Why wouldn't I skip category 6 and go straight to optical fiber?

You can certainly do that but will find that a fiber system is still very expensive. Ultimately it is the economics that drives decisions of customers and today optical fiber together with optical transceivers is about twice as expensive as an equivalent system built using category 6 and associated copper electronics. Installation of copper cabling is more craft friendly and can be accomplished with simple tools and techniques. Additionally copper cabling supports the emerging Data Terminal Equipment (DTE) power standard under development by IEEE (802.3af).

Category 6 Cable Questions

What is the difference between enhanced category 5e cable rated for 400 MHz and category 6 cable rated for 250 MHz?

Category 5e requirements are specified up to 100 MHz. Cables can be tested up to any frequency that is supported by the test equipment, but such measurements are meaningless without the context of applications and cabling standards. The category 6 standard sets minimum requirements up to 250 MHz for cables, connecting hardware, patch cords, channels and permanent links and therefore guarantees reasonable performance that can be utilized by applications.

Why did all the category 6 cable used to have a spline, and now they offer without one?

Some category 6 cable designs have a spline to increase the separation between pairs and also to maintain the pair geometry. This additional separation improves NEXT performance and allows category 6 compliance to be achieved. With advances in technology, manufacturers have found other ways of meeting category 6 requirements. The bottom line is it does not matter what the internal construction of the cable is so long as it meets all the transmission and physical requirements of category 6. The standard does not dictate any particular method of cable construction.

Is there a limitation on the size of bundles one can have with category 6? Can you have 200-300 and still pass category 6?

There is no limit imposed by the standards on the maximum number of category 6 cables in a bundle. This is a matter for the market and the industry to determine based on practical considerations. It should be pointed out that after 6 or 8 cables, the performance in any cable will not change significantly since the cables will be too far away to add any additional external (or alien) NEXT.

Category 6 Patch Cord Questions

Will contractors be able to make their own patch cords?

Category 6 patch cords are precision products, just like the cables and the connectors. They are best manufactured and tested in a controlled environment to ensure consistent, reliable performance. This will ensure interoperability and backward compatibility. . All this supports patch cords as a factory assembled product rather than a field assembled product.

Do you have to use the manufacturer's patch cords to get category 6 performance?

The category 6 standard has specifications for patch cords and connectors that are intended to assure interoperable category 6 performance. If manufacturers can demonstrate that each component meets the requirements in the standard, minimum category 6 performance will be achieved. However, manufacturers may also design their products to perform better than the minimum category 6 requirements and in these cases using compatible patch cords and connectors may lead to performance above the minimum category 6 requirements.

Category 6 Testing Questions

Why do field tester manufacturers offer many different link adapters if everyone meets the standard?

This was an interim solution while the standard was still being developed and the interoperability requirements were not established. It is likely that soon one or more adapters will work for testing of cabling from all vendors.

Would you get passing test results if you used a link adapter not recommended by a manufacturer?

You should expect to get passing results if both the link adapter interface and the mating jack that is part of the link are both compliant to category 6 requirements.

Category 6 Connecting Hardware Questions

Are the connectors for category 5e and category 6 different? Why are they more expensive?

Although category 6 and category 5e connectors may look alike, category 6 connectors have much better transmission performance. For example, at 100 MHz, NEXT of a category 5e connector is 43 dB while NEXT of a category 6 Connector is 54 dB. This means that a category 6 connector couples about 1/12 of the power that a category 5e connector couples from one pair to another pair. Conversely, one can say that a category 6 connector is 12 times less “noisy” compared to a category 5e connector. This vast improvement in performance was achieved with new technology, new processes, better materials, and significant R&D resources, leading to higher costs for manufacturers.

What will happen if I mix and match different manufacturers’ hardware together?

If the components are category 6 compliant, then you will be assured of category 6 performance.

TIA Category 6 Consortium Member URLs for Product Information

3M	http://www.3m.com/
Anixter	http://www.anixter.com/
Avaya	http://www.connectivity.avaya.com/
Corning	http://www.corning.com/
Draka Comteq	http://www.drakacomteq.com/
Intertek Testing Services ETL Semko	http://www.etlsemko.com/
Fluke Networks	http://www.fluke.com/
General Cable	http://www.generalcable.com/
Hellermann Tyton	http://www.hellermann.tyton.com/
Hitachi Cable Manchester Inc.	http://www.hcm.hitachi.com/
Hubbell	http://www.hubbell.com/
Krone	http://www.krone.com/
Leviton	http://www.levitonvoicedata.com/
Mohawk/CDT	http://www.mohawk-cdt.com/
Molex	http://www.molexpn.com/
Nexans	http://www.nexans.com/
Nordx/CDT	http://www.nordx.com/
Ortronics	http://www.ortronics.com/
Panduit	http://www.panduit.com/
The Siemon Company	http://www.siemon.com/
Superior Essex	http://www.superioressex.com/
Superior Modular Products	http://www.superiormod.com/
Suttle	http://www.suttleonline.com/
Tyco Electronics / AMP NETCONNECT	www.ampnetconnect.com
UL	http://www.ul.com/lancable