What are the Category of a (Wire UTP}?

**Category 1 cable**, also known as **Cat 1**, **Level 1**, or **voice-grade copper**, is a grade of [unshielded twisted pair](https://en.wikipedia.org/wiki/Unshielded_twisted_pair) cabling designed for [telephone](https://en.wikipedia.org/wiki/Telephone) communications, and at one time was the most common [on-premises wiring](https://en.wikipedia.org/wiki/On-premises_wiring). The maximum frequency suitable for transmission over Cat 1 cable is 1 MHz,[[1]](https://en.wikipedia.org/wiki/Category_1_cable#cite_note-Meyers1-1) but Cat 1 is not currently considered adequate for data transmission (though it was at one time used for that purpose on the [Apple Macintosh](https://en.wikipedia.org/wiki/Apple_Macintosh) starting in the late 1980s in the form of [Farallon Computing's//NetTopia's](https://en.wikipedia.org/wiki/Farallon_Computing) [PhoneNet](https://en.wikipedia.org/wiki/PhoneNet" \o "PhoneNet), an implementation of Apple's [LocalTalk](https://en.wikipedia.org/wiki/LocalTalk) networking hardware standard).

Although not an official category standard established by TIA/EIA, Category 1 has become the de facto name given to **Level 1** cables originally defined by [Anixter International](https://en.wikipedia.org/wiki/Anixter_International), the distributor. Cat 1 cable was typically used for networks that carry only voice traffic, for example telephones. Official [TIA/EIA-568](https://en.wikipedia.org/wiki/TIA/EIA-568) standards have only been established for cables of [Category 3](https://en.wikipedia.org/wiki/Category_3_cable) ratings or above.

**Category 2 cable**, also known as **Cat 2**, is a grade of [unshielded twisted pair](https://en.wikipedia.org/wiki/Unshielded_twisted_pair) cabling designed for [telephone](https://en.wikipedia.org/wiki/Telephone) and data communications. The maximum frequency suitable for transmission over Cat 2 cable is 4 MHz, and the maximum [bandwidth](https://en.wikipedia.org/wiki/Bandwidth_(computing)) is 4 Mbit/s. Cat 2 cable contains 4 pairs of wires, or 8 wires total.

Official [TIA/EIA-568](https://en.wikipedia.org/wiki/TIA/EIA-568) standards have only been established for cables of Category 3 ratings or above. Though not an official category standard established by TIA/EIA, Category 2 has become the de facto name given to Level 2 cables originally defined by [Anixter International](https://en.wikipedia.org/wiki/Anixter_International), the distributor

Anixter *Level 2* cable was frequently used on [ARCnet](https://en.wikipedia.org/wiki/ARCnet" \o "ARCnet) and 4 Mbit/s [Token Ring](https://en.wikipedia.org/wiki/Token_Ring) networks, it is also used in telephone networks but it is no longer commonly used.

Cat 3 was widely used in [computer networking](https://en.wikipedia.org/wiki/Computer_network) in the early 1990s for [10BASE-T](https://en.wikipedia.org/wiki/10BASE-T) Ethernet and, to a much lesser extent, for [100BaseVG](https://en.wikipedia.org/wiki/100BaseVG) Ethernet, [Token Ring](https://en.wikipedia.org/wiki/Token_Ring) and [100BASE-T4](https://en.wikipedia.org/wiki/100BASE-T4). The original [Power over Ethernet](https://en.wikipedia.org/wiki/Power_over_Ethernet) 802.3af specification supports the use of Cat 3 cable, but the later 802.3at Type 2 high-power variation does not.[[5]](https://en.wikipedia.org/wiki/Category_3_cable#cite_note-33.1.1c-5) In some use cases and for short distances, Cat 3 may be capable of carrying 100BASE-TX (2 pairs) or even 1000BASE-T (4 pairs). Such use cases include hobbyist retrofitting short home telephone Cat 3 networks for Ethernet.

Dedicated 100BASE-T4 networks, supporting 100 Mbit/s over Cat 3, appear to have been a rarity as very few network interface controllers and switches were ever released. Some examples include the [3com](https://en.wikipedia.org/wiki/3com) 3C250-T4 Superstack II HUB 100, [IBM](https://en.wikipedia.org/wiki/IBM) 8225 Fast Ethernet Stackable Hub[[9]](https://en.wikipedia.org/wiki/Category_3_cable#cite_note-9) and [Intel](https://en.wikipedia.org/wiki/Intel) LinkBuilder FMS 100 T4.[[10]](https://en.wikipedia.org/wiki/Category_3_cable#cite_note-10)[[11]](https://en.wikipedia.org/wiki/Category_3_cable#cite_note-11) The same applies to [network interface controller](https://en.wikipedia.org/wiki/Network_interface_controller) cards. Bridging 100BASE-T4 with 100BASE-TX required additional network equipment.

**Category 4 cable** (**Cat 4**) is a [cable](https://en.wikipedia.org/wiki/Copper_wire_and_cable) that consists of eight [copper wires](https://en.wikipedia.org/wiki/Copper_wire_and_cable) arranged in four [unshielded twisted pairs](https://en.wikipedia.org/wiki/Unshielded_twisted_pair) (UTP) supporting [signals](https://en.wikipedia.org/wiki/Signal) up to 20 [MHz](https://en.wikipedia.org/wiki/Megahertz).

[[1]](https://en.wikipedia.org/wiki/Category_4_cable#cite_note-1) It is used in telephone networks which can transmit voice and data up to 16 [Mbit](https://en.wikipedia.org/wiki/Megabit)/s.

[[2]](https://en.wikipedia.org/wiki/Category_4_cable#cite_note-2)For a brief period it was used for some [Token Ring](https://en.wikipedia.org/wiki/Token_Ring),

[[3]](https://en.wikipedia.org/wiki/Category_4_cable#cite_note-3) [10BASE-T](https://en.wikipedia.org/wiki/10BASE-T), and [100BASE-T4](https://en.wikipedia.org/wiki/100BASE-T4) networks, but was quickly superseded by [Category 5 cable](https://en.wikipedia.org/wiki/Category_5_cable). It is no longer common or used in new installations and is not recognized by the current version of the [ANSI/TIA-568](https://en.wikipedia.org/wiki/ANSI/TIA-568) data cabling standards.

**Category 5 cable** (**Cat 5**) is a [twisted pair](https://en.wikipedia.org/wiki/Twisted_pair) cable for [computer networks](https://en.wikipedia.org/wiki/Computer_network). Since 2001, the variant commonly in use is the **Category 5e** specification (**Cat 5e**). The cable standard provides performance of up to 100 MHz and is suitable for most varieties of [Ethernet over twisted pair](https://en.wikipedia.org/wiki/Ethernet_over_twisted_pair) up to [2.5GBASE-T](https://en.wikipedia.org/wiki/2.5GBASE-T_and_5GBASE-T)

but more commonly runs at [1000BASE-T](https://en.wikipedia.org/wiki/1000BASE-T) (Gigabit Ethernet) speeds. Cat 5 is also used to carry other signals such as [telephone](https://en.wikipedia.org/wiki/Telephone) and [video](https://en.wikipedia.org/wiki/Video).

This cable is commonly connected using [punch-down blocks](https://en.wikipedia.org/wiki/Punch-down_block) and [modular connectors](https://en.wikipedia.org/wiki/Modular_connector). Most Category 5 cables are [unshielded](https://en.wikipedia.org/wiki/Electromagnetic_shielding), relying on the [balanced line](https://en.wikipedia.org/wiki/Balanced_line) twisted pair design and [differential signaling](https://en.wikipedia.org/wiki/Differential_signaling) for noise rejection.

Standards

The specification for category 5 [cable](https://en.wikipedia.org/wiki/Copper_wire_and_cable) is defined in [ISO/IEC 11801](https://en.wikipedia.org/wiki/ISO/IEC_11801), [IEC 61156](https://en.wikipedia.org/wiki/IEC_61156) and [EN 50173](https://en.wikipedia.org/w/index.php?title=EN_50173&action=edit&redlink=1).

The specification for category 5 cable was defined in [ANSI](https://en.wikipedia.org/wiki/American_National_Standards_Institute)/[TIA/EIA-568-A](https://en.wikipedia.org/wiki/ANSI/TIA-568), with clarification in TSB-95.[[5]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-5) These documents specify performance characteristics and test requirements for [frequencies](https://en.wikipedia.org/wiki/Frequencies) up to 100 MHz.

The cable is available in both stranded and solid conductor forms. The stranded form is more flexible and withstands more bending without breaking. [Patch cables](https://en.wikipedia.org/wiki/Patch_cable) are stranded. Permanent wiring used in [structured cabling](https://en.wikipedia.org/wiki/Structured_cabling) is solid-core. The category and type of cable can be identified by the printing on the jacket.

The category 5 specification requires conductors to be pure copper. The industry has seen a rise in non-compliant / counterfeit cables, especially of the Copper Clad Aluminum (CCA) variety.This has exposed the manufacturers or installers of such fake cable to legal liabilities

Variants and comparisons

The category 5e specification improves upon the category 5 specification by revising and introducing new specifications to further mitigate the amount of [crosstalk](https://en.wikipedia.org/wiki/Crosstalk).[[9]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-9) The [bandwidth](https://en.wikipedia.org/wiki/Bandwidth_(signal_processing)) (100 MHz) and physical construction are the same between the two,[[10]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-10) and most Cat 5 cables actually meet Cat 5e specifications, though they are not specifically certified as such.[[11]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-11) The category 5 was deprecated in 2001 and superseded by the category 5e specification.[[12]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-Axis-12)

The [Category 6](https://en.wikipedia.org/wiki/Category_6_cable) specification improves upon the Category 5e specification by extending frequency response and further reducing crosstalk. The improved performance of Cat 6 provides 250 MHz bandwidth.[[12]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-Axis-12) Category 6A cable provides 500 MHz bandwidth. Both variants are [backward compatible](https://en.wikipedia.org/wiki/Backward_compatible) with Category 5 and 5e cables.

Termination

Cable types, connector types and cabling topologies are defined by [ANSI/TIA-568](https://en.wikipedia.org/wiki/ANSI/TIA-568). Nearly always, [8P8C modular connectors](https://en.wikipedia.org/wiki/8P8C) (often referred to incorrectly as [RJ45](https://en.wikipedia.org/wiki/Registered_jack) connectors are used for connecting category 5 cable. The cable is terminated in either the [T568A](https://en.wikipedia.org/wiki/T568A) scheme or the [T568B](https://en.wikipedia.org/wiki/T568B) scheme. The two schemes work equally well and may be mixed in an installation so long as the same scheme is used on both ends of each cable.

Applications

Category 5 cable is used in structured cabling for [computer networks](https://en.wikipedia.org/wiki/Computer_network) such as [Ethernet over twisted pair](https://en.wikipedia.org/wiki/Ethernet_over_twisted_pair). The cable standard prescribes performance parameters for frequencies up to 100 MHz and is suitable for [10BASE-T](https://en.wikipedia.org/wiki/10BASE-T), [100BASE-TX](https://en.wikipedia.org/wiki/100BASE-TX) (Fast Ethernet), [1000BASE-T](https://en.wikipedia.org/wiki/1000BASE-T) (Gigabit Ethernet), [2.5GBASE-T](https://en.wikipedia.org/wiki/2.5GBASE-T). 10BASE-T and 100BASE-TX Ethernet connections require two wire pairs. 1000BASE-T and faster Ethernet connections require four wire pairs. Through the use of [power over Ethernet](https://en.wikipedia.org/wiki/Power_over_Ethernet) (PoE), [power](https://en.wikipedia.org/wiki/Electric_power) can be carried over the cable in addition to Ethernet data.

Cat 5 is also used to carry other signals such as [telephony](https://en.wikipedia.org/wiki/Telephony) and [video](https://en.wikipedia.org/wiki/Video). In some cases, multiple signals can be carried on a single cable; Cat 5 can carry two conventional telephone lines as well as 100BASE-TX in a single cable.The [USOC/RJ-61](https://en.wikipedia.org/wiki/RJ61) wiring standard may be used in multi-line telephone connections. Various schemes exist for transporting both analog and digital video over the cable. [HDBaseT](https://en.wikipedia.org/wiki/HDBaseT) (10.2 Gbit/s) is one such scheme

Characteristics

The use of [balanced lines](https://en.wikipedia.org/wiki/Balanced_line) helps preserve a high [signal-to-noise ratio](https://en.wikipedia.org/wiki/Signal-to-noise_ratio) despite interference from both external sources and crosstalk from other pairs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Electrical characteristics for a commercially available Cat 5e UTP cable product** | | | | |
| **Property** | [**Nominal**](https://en.wikipedia.org/wiki/Real_versus_nominal_value) | **Tolerance** | **Unit** | **ref** |
| [Characteristic impedance](https://en.wikipedia.org/wiki/Characteristic_impedance), 1–100 [MHz](https://en.wikipedia.org/wiki/Hertz) | 100 | ± 15 | [Ω](https://en.wikipedia.org/wiki/Ohm) | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| Characteristic [impedance](https://en.wikipedia.org/wiki/Electrical_impedance) @ 100 MHz | 100 | ± 5 | Ω | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| [DC loop resistance](https://en.wikipedia.org/wiki/Copper_cable_certification#DC_Loop_Resistance) | ≤ 0.188 |  | Ω/m | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| [Propagation speed](https://en.wikipedia.org/wiki/Propagation_speed) relative to the [speed of light](https://en.wikipedia.org/wiki/Speed_of_light) | 0.64 |  | 1 | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| [Propagation delay](https://en.wikipedia.org/wiki/Propagation_delay) | 5.30 |  | [ns](https://en.wikipedia.org/wiki/Nanosecond)/m | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| [Delay skew](https://en.wikipedia.org/wiki/Copper_cable_certification#Delay_Skew) < 100 MHz | < 0.20 |  | ns/m | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| [Capacitance](https://en.wikipedia.org/wiki/Capacitance) at 800 Hz | 52 |  | [pF](https://en.wikipedia.org/wiki/Farad)/m | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| Max tensile load, during installation | 100 |  | [N](https://en.wikipedia.org/wiki/Newton_(unit)) | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| Wire diameter (24 [AWG](https://en.wikipedia.org/wiki/American_wire_gauge); 0.205 mm2)) | 0.51 |  | mm | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| Operating temperature | −55 to +60 |  | °C | [[24]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-drakacom_cat5-24) |
| Maximum [DC](https://en.wikipedia.org/wiki/Direct_current) operating voltage ([PoE](https://en.wikipedia.org/wiki/Power_over_Ethernet#Standard_implementation) uses max 57 V)[[25]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-Table_33.11-25) | 125 |  | [V](https://en.wikipedia.org/wiki/Volt) | [[26]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-schrack-kabely-26) |

**Insulation**

Outer insulation is typically [polyvinyl chloride](https://en.wikipedia.org/wiki/Polyvinyl_chloride) (PVC) or [low smoke zero halogen](https://en.wikipedia.org/wiki/Low_smoke_zero_halogen) (LS0H).

|  |  |
| --- | --- |
| **Example materials used as insulation in the cable**[[28]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-28) | |
| **Acronym** | **Material** |
| PE | [Polyethylene](https://en.wikipedia.org/wiki/Polyethylene) |
| FP | Foamed polyethylene |
| FEP | [Fluorinated ethylene propylene](https://en.wikipedia.org/wiki/Fluorinated_ethylene_propylene) |
| FFEP | Foamed fluorinated ethylene propylene |
| AD/PE | Air dielectric/polyethylene |
| LSZH or LS0H | Low smoke, zero [halogen](https://en.wikipedia.org/wiki/Halogen) |
| LSFZH or LSF0H | Low smoke and fume, zero halogen |

**Bending radius**

Most Category 5 cables can be bent at any radius exceeding approximately four times the outside diameter of the cable.

**Maximum cable segment length**

The maximum length for a cable segment is 100 meters (330 ft) per TIA/EIA 568-5-A.[[31]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-31) If longer runs are required, the use of active hardware such as a repeater or switch is necessary.[[32]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-32)[[33]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-33) The specifications for 10BASE-T networking specify a 100-meter length between active devices.[[34]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-34) This allows for 90 meters of solid-core permanent wiring, two connectors and two stranded patch cables of 5 meters, one at each end.[[35]](https://en.wikipedia.org/wiki/Category_5_cable#cite_note-35)

**Conductors**

Since 1995, solid-conductor UTP cables for backbone cabling is required to be no thicker than 22 [American Wire Gauge](https://en.wikipedia.org/wiki/American_Wire_Gauge) (AWG) and no thinner than 24 AWG, or 26 AWG for shorter-distance cabling. This standard has been retained with the 2009 revision of ANSI TIA/EIA 568

Although cable assemblies containing 4 pairs are common, category 5 is not limited to 4 pairs. Backbone applications involve using up to 100 pairs.

**Individual twist lengths**

The distance per twist is commonly referred to as pitch. Each of the four pairs in a Cat 5 cable has differing precise pitch to minimize [crosstalk](https://en.wikipedia.org/wiki/Crosstalk_(electronics)) between the pairs. The pitch of the twisted pairs is not specified in the standard. Measurements on one sample of Cat 5 cable yielded the following results

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Pair color** | **[cm] per turn** | **Turns per [m]** |
|  | Blue | 1.38 | 72 |
|  | Green | 1.53 | 65 |
|  | Orange | 1.78 | 56 |
|  | Brown | 1.94 | 52 |

Since the pitch of the various colors is not specified in the standard, pitch can vary and should be measured for the batch being used if the cable is being used in a non-Ethernet situation where pitch may be critical.

**Category 6 cable** (**Cat 6**) is a standardized [twisted pair](https://en.wikipedia.org/wiki/Twisted_pair) cable for [Ethernet](https://en.wikipedia.org/wiki/Ethernet) and other network [physical layers](https://en.wikipedia.org/wiki/Physical_layer) that is [backward compatible](https://en.wikipedia.org/wiki/Backward_compatible) with the [Category 5/5e](https://en.wikipedia.org/wiki/Category_5_cable) and [Category 3 cable](https://en.wikipedia.org/wiki/Category_3_cable) standards.

Cat 6 must meet more stringent specifications for [crosstalk](https://en.wikipedia.org/wiki/Crosstalk) and system noise than Cat 5 and Cat 5e. The cable standard specifies performance of up to 250 MHz, compared to 100 MHz for Cat 5 and Cat 5e.

Whereas Category 6 cable has a reduced maximum length of 55 metres (180 ft) when used for [10GBASE-T](https://en.wikipedia.org/wiki/10GBASE-T), **Category 6A cable** is characterized to 500 MHz and has improved [alien crosstalk](https://en.wikipedia.org/wiki/Alien_crosstalk) characteristics, allowing 10GBASE-T to be run for the same 100-metre (330 ft) maximum distance as previous [Ethernet variants](https://en.wikipedia.org/wiki/Ethernet_over_twisted_pair).

History

Cat 6, an [unshielded twisted-pair](https://en.wikipedia.org/wiki/Unshielded_twisted-pair) (UTP) design, emerged as an advancement of the UTP Cat 5e, and was formalised in 2001. The design of Cat 6 required more stringent precision in manufacturing, and this enabled reduced noise and crosstalk, allowing improved performance. The [Telecommunications Industry Association](https://en.wikipedia.org/wiki/Telecommunications_Industry_Association) (TIA) published Cat 6 in June 2002.

Description

Cat 6 cable can be identified by the printing on the side of the cable sheath.[[3]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-3) Cable types, connector types and cabling topologies are defined by [ANSI/TIA-568](https://en.wikipedia.org/wiki/ANSI/TIA-568).

Cat 6 patch cables are normally terminated in [8P8C](https://en.wikipedia.org/wiki/8P8C) modular connectors, using either [T568A or T568B](https://en.wikipedia.org/wiki/ANSI/TIA-568#T568A_and_T568B_termination) pin assignments; performance is comparable provided both ends of a cable are terminated identically.

If Cat 6-rated patch cables, jacks and connectors are not used with Cat 6 wiring, overall performance is degraded and may not meet Cat 6 performance specifications.[[4]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-4)

The Cat 6 specification requires conductors to be pure copper. The industry has seen a rise in non-compliant or counterfeit cables, especially of the [copper-clad aluminium wire](https://en.wikipedia.org/wiki/Copper-clad_aluminium_wire) (CCA) variety.[[5]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-5) This has exposed the manufacturers or installers of such fake cable to legal liabilities.[[6]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-6)

Category 6A

The standard for Category 6A (augmented Category 6) is ANSI/TIA-568.2-D (replaces 568-C.2),[[7]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-7) defined by TIA for enhanced performance standards for twisted pair cable systems. It was defined in 2018.[[8]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-8) Cat 6A performance is defined for frequencies up to 500 MHz—twice that of Cat 6. Cat 6A also has an improved alien crosstalk specification as compared to Cat 6, which picks up high levels of alien noise at high frequencies.

The global cabling standard [ISO/IEC 11801](https://en.wikipedia.org/wiki/ISO/IEC_11801) has been extended by the addition of amendment 2. This amendment defines new specifications for Cat 6A components and Class EA permanent links. These new global Cat 6A/Class EA specifications require a new generation of connecting hardware offering far superior performance compared to the existing products that are based on the American TIA standard.[[9]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-NewCat6A-9) The most important point is a performance difference between ISO/IEC and EIA/TIA component specifications for the NEXT transmission parameter. At a frequency of 500 MHz, an ISO/IEC Cat 6A connector performs 3 dB better than a Cat 6A connector that conforms with the EIA/TIA specification (3 dB equals 50% reduction of near-end crosstalk noise signal power; see [half-power point](https://en.wikipedia.org/wiki/Half-power_point)).[[9]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-NewCat6A-9)

Confusion therefore arises because of the naming conventions and performance benchmarks laid down by the International ISO/IEC and American TIA/EIA standards, which in turn are different from the regional European standard, EN 50173-1. In broad terms, the ISO standard for Cat 6A is the most stringent, followed by the European standard, and then the American (1 on 1 matching capability).[[10]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-10)[[11]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-11)[[*failed verification*](https://en.wikipedia.org/wiki/Wikipedia:Verifiability)]

Category 6e and beyond

After the ratification of Cat 6, manufacturers began offering cables labeled as **Category 6e**. The intent was to market *Cat 6e* as a pseudo official upgrade to the Category 6 standard naming it after the Category 5e standard. Officially Cat 6e is not a recognized ISO standard.

[Category 7](https://en.wikipedia.org/wiki/Category_7_cable) is an ISO standard, but not a TIA standard; it is a shielded cable with newer connectors ([GG45](https://en.wikipedia.org/wiki/GG45) or [TERA](https://en.wikipedia.org/wiki/TERA)) that are not backward-compatible with category 3 through 6A. [Category 8](https://en.wikipedia.org/wiki/Category_8_cable) is the next network cabling offering to be backward compatible.[[12]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-12)

Maximum length

When used for [10/100/1000](https://en.wikipedia.org/wiki/10/100/1000)BASE-T, the maximum allowed length of a Cat 6 cable is 100 meters (328 ft). This consists of 90 meters (295 ft) of solid *horizontal* cabling between the patch panel and the wall jack, plus 5 meters (16 ft) of stranded patch cable between each jack and the attached device.[[13]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-13) For [10GBASE-T](https://en.wikipedia.org/wiki/10_Gigabit_Ethernet), an unshielded Cat 6 cable should not exceed 55 meters and a Cat 6A cable should not exceed 100 meters.[[14]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-14)

Installation requirements

Category 6 and 6A cable must be properly installed and terminated to meet specifications. The cable must not be kinked or bent too tightly; the bend radius should be larger than four times the outer diameter of the cable.[[15]](https://en.wikipedia.org/wiki/Category_6_cable#cite_note-15) The wire pairs must not be untwisted and the outer jacket must not be stripped back more than 13 mm (0.51 in).

Cable shielding may be required in order to avoid data corruption in high [electromagnetic interference](https://en.wikipedia.org/wiki/Electromagnetic_interference) (EMI) environments. Shielding is typically maintained from one cable end to the other using a drain wire that runs through the cable alongside the twisted pairs. The shield's electrical connection to the chassis on each end is made through the jacks. The requirement for ground connections at both cable ends creates the possibility of creating a [ground loop](https://en.wikipedia.org/wiki/Ground_loop_(electricity)). This undesirable situation may compel currents to flow in the network cable shield and these currents may in turn induce detrimental noise in the signal being carried by the cable.

**Class F** channel and **Category 7** cable are [backward compatible](https://en.wikipedia.org/wiki/Backward_compatible) with Class D/Category 5e and Class E/Category 6. Class F features even stricter specifications for [crosstalk](https://en.wikipedia.org/wiki/Crosstalk) and system noise than Class E. To achieve this, [shielding](https://en.wikipedia.org/wiki/Shielded_pair) was added for individual wire pairs and the cable as a whole. Unshielded cables rely on the quality of the twists to protect from EMI. This involves a tight twist and carefully controlled design. Cables with individual shielding per pair such as category 7 rely mostly on the shield and therefore have pairs with longer twists.[[1]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-1)

The Category 7 cable standard was ratified in 2002, and primarily introduced to support [10 gigabit Ethernet](https://en.wikipedia.org/wiki/10_Gigabit_Ethernet) over 100 m of [copper](https://en.wikipedia.org/wiki/Copper) cabling.[[2]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-2) It contains four twisted copper wire pairs, just like the earlier standards, terminated either with [GG45](https://en.wikipedia.org/wiki/GG45) electrical connectors or with [TERA](https://en.wikipedia.org/wiki/TERA) connectors rated for transmission frequencies of up to 600 MHz.[[3]](https://en.wikipedia.org/wiki/ISO/IEC_11801" \l "cite_note-3)

However, in 2006, Category 6A was ratified for Ethernet to allow 10 Gbit/s while still using the traditional [8P8C](https://en.wikipedia.org/wiki/8P8C) connector (often erroneously referred to as [RJ-45](https://en.wikipedia.org/wiki/RJ-45), a visually similar connector). Care is required to avoid signal degradation by mixing cable and connectors not designed for that use, however similar. Most manufacturers of active equipment and network cards have chosen to support the 8P8C for their 10 gigabit Ethernet products on copper and not the [GG45](https://en.wikipedia.org/wiki/GG45), [ARJ45](https://en.wikipedia.org/wiki/ARJ45), or [TERA](https://en.wikipedia.org/wiki/TERA).[[4]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-Alliance-4) Therefore, the Category 6 specification was revised to Category A to permit this use; products therefore require a Class EA channel (ie, Cat 6A).

As of 2019 some equipment has been introduced which has connectors supporting the Class F (Category 7) channel.

Note, however, that Category 7 is not recognized by the [TIA](https://en.wikipedia.org/wiki/Telecommunications_Industry_Association)/[EIA](https://en.wikipedia.org/wiki/Electronic_Industries_Alliance).

Category 8 was ratified by the TR43 working group under ANSI/TIA 568-C.2-1. It is defined up to 2000 MHz and only for distances up to 30 m or 36 m, depending on the patch cords used.

[ISO/IEC JTC 1/SC 25](https://en.wikipedia.org/wiki/ISO/IEC_JTC_1/SC_25)/WG 3 developed the equivalent standard ISO/IEC 11801-1:2017/COR 1:2018, with two options:[[7]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-flatman1-7)[[8]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-flatman2-8)[[9]](https://en.wikipedia.org/wiki/ISO/IEC_11801#cite_note-flatman3-9)

* **Class I** channel (**Category 8.1** cable): minimum cable design [U/FTP](https://en.wikipedia.org/wiki/Shielded_pair) or F/UTP, fully backward compatible and interoperable with Class EA (Category 6A) using [8P8C connectors](https://en.wikipedia.org/wiki/Modular_connector#8P8C);
* **Class II** channel (**Category 8.2** cable): F/FTP or S/FTP minimum, interoperable with Class FA (Category 7A) using [TERA](https://en.wikipedia.org/wiki/TERA) or [GG45](https://en.wikipedia.org/wiki/GG45).

Category 8 cabling was designed primarily for data centers where distances between switches and servers are short and is not intended for general office cabling.

Acronyms for twisted pairs

*Acronyms for balanced cables*, provides a system to specify the exact construction for both unshielded and shielded balanced twisted pair cables. It uses three letters - U for unshielded, S for braided shielding, and F for foil shielding - to form a two-part abbreviation in the form of xx/xTP, where the first part specifies the type of overall cable shielding, and the second part specifies shielding for individual cable elements.

Common cable types include U/UTP (unshielded cable); U/FTP (individual pair shielding without the overall screen); F/UTP, S/UTP, or SF/UTP (overall screen without individual shielding); and F/FTP, S/FTP, or SF/FTP (overall screen with individual foil shielding).