

Data Cable

LANmark™ Category 6 UTP, 4 pair Horizontal Cable

Description

Alcatel LANmark™ Category 6 UTP cable has been designed from inception to guarantee optimal support of Hi-Speed data protocols delivering above 1 Gbps performance to the workstation. It specifically addresses all of the new additional electrical performance levels required by Hi-Speed applications operating in full duplex mode including Far End Crosstalk (FEXT) and Balance Requirements.

The cable is guaranteed to exceed all Category 6 performance criteria currently defined in international standardisation due to its C3 (Central Crosstalk Cancellation) design.

Construction

Plain copper wire insulated with high grade polyethylene. Two insulated conductors twisted together to form a pair and four such pairs laid up in the C³ cross member to form the basic unit. Sheathed in flame retardant PVC or LSZH (Low Smoke Zero Halogen) jacketing material.

Standards

International	ISO/IEC 11801, Category 6 (draft)
European	EN 50173 EN 50288 (draft)
American	TIA/EIA 568B

Benefits

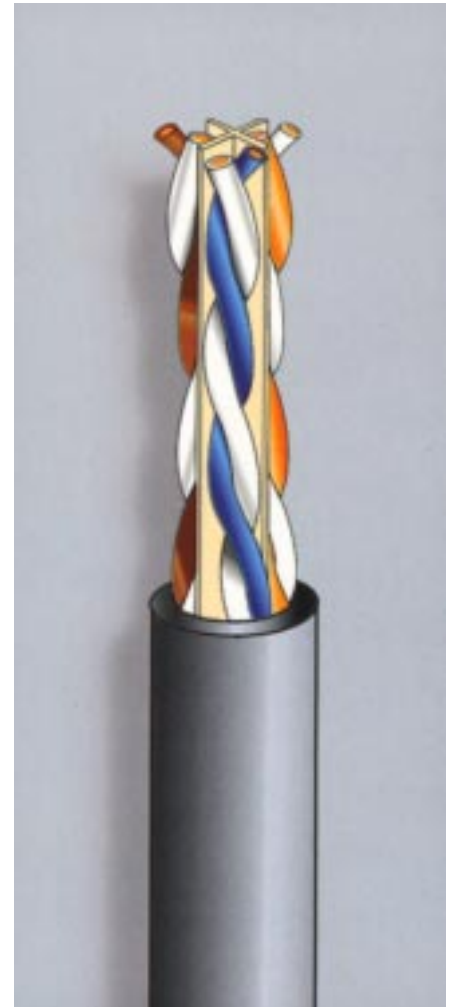
- Keeps infrastructure ahead of networking revolution
- Cost effective upgrade solution for full protection
- Completely open architecture for easy integration into existing networks
- Perfect for all ultra Hi-Speed applications

Features

- Exceeds draft Category 6 requirements
- Ultimate performing UTP cable
- Exceeds full duplex Global Crosstalk values
- C3 technology gives outstanding and stable performance
- Small, round construction for ease of use
- Easy installation - no special tools required

Warranty

- **Applications**
Guaranteed support of all Hi-Speed requirements including Gigabit Ethernet & beyond
- **Quality**
Guaranteed performance
- **Category 6**
Guaranteed to meet all existing and proposed drafts
- **Backward compatibility**
Guaranteed to be compliant with all RJ45 interfaces



Leaping the Gigabit Barrier

Designer Notes

Alcatel LANmark™ Category 6 UTP cable is the result of extensive research in Alcatel laboratories benefiting from experience gained in Hi-Speed networking technology like xDSL. The development considered all of the parameters of copper data cables and ultra Hi-Speed applications and merged the technologies together to create the highest performing cable possible, utilising new and innovative design features to ensure that full application support can be guaranteed for the future.

• Hi-Speed Protocols

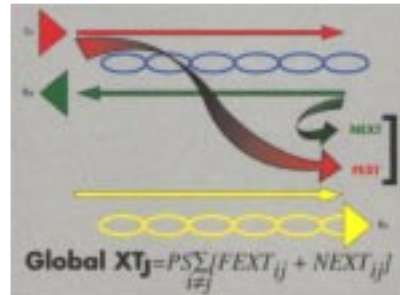
Hi-Speed protocols use complex coding schemes and rely on simultaneous Full Duplex transmission over four pairs to reach data rates in excess of 1 Gigabit. This complexity added at the Media Access Control (MAC) sub-layer of the OSI model radically changes the demands placed on cabling infrastructure. Alcatel Category 6 FTP meets all of these new requirements.

Alcatel LANmark™ Category 6 Electrical Characteristics

• Hi-Frequency Testing

Alcatel LANmark™ Category 6 UTP cable is tested to deliver guaranteed performance attributes up to 350 MHz. This is essential for Hi-Speed applications to include both first and second frequency harmonics of transmission protocols to ensure full data recovery at the receiver. Gigabit Ethernet uses a 125 MHz base bandwidth spectrum and therefore the cable needs to be characterised to at least 250 MHz.

- **Global Crosstalk Summation:**
min 37.1 dB @ 200 MHz



Global Crosstalk

With the new protocols, such as Gigabit Ethernet, the data travels simultaneously in opposite directions on all four pairs. The most revolutionary feature of Alcatel's LANmark™ Category 6 UTP cable is the global approach it has adopted towards crosstalk. Global Crosstalk not only combines NEXT (Near End Crosstalk) and FEXT (Far End Crosstalk) but also takes Powersum factors into consideration.

It is a measure of the total influence on transmitted signal along a pair, by signals travelling along adjacent pairs. Alcatel sets very high levels for this criteria to ensure that total summation of the noise generated by NEXT and FEXT crosstalk do not exceed the capabilities of the receiver.

PS NEXT: min 38.5 dB @ 200 MHz
PS EL-FEXT: min 28.6 dB @ 200 MHz

Alcatel LANmark™ Category 6 cable uses a normalised measure of FEXT integrating attenuation effects (EL-FEXT = FEXT ÷ Attenuation).

- **Attenuation:**
max 28 dB @ 200 MHz

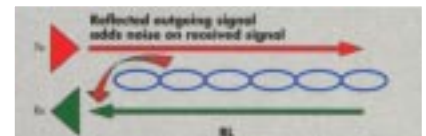
Attenuation is designed to ensure that more signal is transmitted to the receiver to result in cleaner data transmission and allow for easier distinction between incoming signal and noise.

- **PS ACR:**
min 10.4 dB @ 200 MHz

Powersum Attenuation to Crosstalk Ratio is a critical factor for establishing Link performance and is optimised as a result of NEXT and Attenuation improvements.

- **Impedance: ± 15 ohms**
Return Loss 20 dB @ 200 MHz

The reflected amount of signal energy is kept to a minimum to limit signal distortion that causes recognition conflict at the receiver between incoming usable signal and reflected signal. This is a critical factor when using multi-level full duplex transmission.



Return Loss

- **Delay Skew: 15 ns/100 m**

Delay skew is a measure of the propagation difference in delay between split data transmitted over four pairs. Alcatel reduces this to ensure proper reassembling of the data at the receiver.

- **LCL: min 30.8 dB @ 100 MHz**

Alcatel has drastically improved these important criteria. Balance, of which LCL is a measure, is key in ensuring the highest possible cancellation of common mode signals at the receiver and transmitter. These signals are the result of unpredictable electromagnetic interference, which cannot be cancelled by electronic means.

- **Coupling Attenuation**
min 45 dB @ 30 MHz

Alcatel LANmark™ Category 6 UTP cable specifies Coupling Attenuation as a measure of the overall level of EMI protection obtained from the cable structure.

C³ ... high technology from Alcatel

The unique C³ (Central Crosstalk Cancellation) construction from Alcatel has been developed to ensure that the performance of our cables is above the Category 6 requirements at all times.

- **Excellent electrical performance at all times**
- **Balance regularity is incredibly stable**
- **NEXT and FEXT reduced dramatically for optimum security**
- **Increased crush resistance**
- **Increased installation strength**
- **Reduced tendency to kink**
- **Small cable diameter- no concern over cabling densities**
- **Easy termination - no special tools needed**

Premium performance benefits

C³ is a central transparent element formed precisely in the shape of a cross to place and hold the individual

pairs at exactly the correct distance from each other to ensure that incredibly high electrical performance is achieved.

The forced symmetry of the pairs, locked into place in the cross, means that electrical characteristics such as Balance, which is of key importance to protocols such as Gigabit Ethernet and cannot be tested in the field, are controlled and remain stable throughout the life of the network.

The NEXT and FEXT values of the cabling are kept to a maximum with the C³ technology, in a way which will keep your network running for the foreseeable future with full peace of mind at all times.

Dramatically helps installation stability

C³ has a further design consideration to it. Running through the centre is a nylon cord. This was introduced to aid installation. The high strength of nylon means that the C³ element can be

used to pull the cable into ducting and up risers.

When higher and higher frequencies are used to transmit data rates like Gigabit Ethernet, the untwisting of the pairs at the punch down can become crucial. By leaving the C³ member in place the pairs can be held in the right position right up to punch down and can be terminated far quicker than with standard cable geometry.

The increased crush resistance of the cable gives added assistance to the installer. If a cable is crushed by the application of cable ties in the horizontal or at the outlet when tying the cable to the IDC, the pairs can be damaged and the pairs moved apart, thus creating a potential problem with electrical performance, particularly at higher frequencies. The C³ member greatly reduces the risk of this happening. And unlike other products, the cables do not require any special tools or training. Just cut off the C³ element when it is not required, with a standard knife or cutters.

Alcatel LANmark™ Category 6 Guarantees

Alcatel LANmark™ Category 6 UTP cable is backed by extensive guarantees from Alcatel.

• Quality testing

All Alcatel's Category 6 UTP is completely tested during the manufacturing process using the latest swept frequency testing technology to meet all electrical parameters.

• Backward compatibility

Ensures full compatibility and integration into existing RJ45 hardware.

• Category 6 performance

The cable meets and exceeds latest proposals for Category 6

• Application Support

Full application support is guaranteed including the latest Gigabit Ethernet and beyond

A Technological Leap ...

- **improved NEXT +350%**
- **improved Attenuation +35%**
- **improved Frequency +350%**
- **improved RL +150%**
- **improved Skew +200%**
- **improved ACR +460%**

• Global Crosstalk Summation

- **EL-FEXT 22dB**
- **LCL 30.8 dB @ 100 MHz**
- **Coupling Attenuation 75dB**
- **performance protection during installation**
- **backward compatibility**

The only choice for Category 6

Alcatel's commitment to the future means that you will never have to worry about protecting your network investment.

There is only one choice when it comes to Category 6 cabling and leaping the Gigabit barrier - Alcatel

Technical data - physical

	4 Pair PVC	4 Pair LSZH
Conductor diameter (mm)	0.55	0.55
Insulation diameter (mm)	0.95	0.95
Cable diameter (mm)	6.0	6.0
Nominal cable weight (kg/km)	43	43
Copper weight (kg/km)	18	18
Max. installation tension (N)	100	100
Min. bend radius - operation (mm)	25	25
Min. bend radius - installation (mm)	50	50
Fire behaviour IEC 332.1	Yes	Yes
Fire load (Mj/km)	480	480

Colour code

C ³ member	Transparent with Nylon centre
Pair 1	White/Blue
Pair 2	White /Orange
Pair 3	White/Green
Pair 4	White/Brown

Technical data - Guaranteed electrical values

Frequency (MHz)	Attenuation (dB/100m)	Powersum ACR (dB/100m)	pair/pair NEXT (dB)	Powersum NEXT (dB)	Powersum EL-FEXT (db/100m)	Global Xtalk (db/100m)	Return Loss (dB)	LCL (dB)
1	1.9	70.4	74.3	72.3	72.0	66.1	23.0	45.0
4	3.8	60.2	66.0	64.0	64.8	58.3	23.0	40.7
10	5.9	52.1	60.0	58.0	60.0	52.9	23.0	37.9
16	7.5	47.5	57.0	55.0	57.6	50.1	23.0	36.5
20	8.4	45.1	55.5	53.5	56.4	48.8	23.0	35.8
31.25	10.6	40.0	52.6	50.6	44.0	46.1	23.0	34.4
62.5	15.1	31.8	48.9	46.9	39.9	43.1	23.0	32.2
100	19.4	23.6	45.0	43.0	36.1	40.8	23.0	30.8
155	24.5	15.7	42.2	40.2	31.7	38.5	21.1	29.4
200	28.0	10.4	40.5	38.5	28.6	37.1	20.0	28.7
250	31.7	5.4	39.1	37.1	25.6	35.9	19.0	28.0
300	35.0	0.9	37.8	35.8	22.9	34.9	18.2	27.4
350	38.1	-	36.9	34.9	20.4	33.9	17.6	26.9

Mutual Capacitance	56nF/Km
DC resistance	70 Ω /Km
Skew	<15 ns/100m
Velocity of Propagation	68%
Propagation delay	536ns/100m @ 250 MHz
Characteristic Impedance	100 ± 15 Ω
Coupling attenuation	45 dB @30 MHz

Part numbers

No. Pairs	Part No	Sheath	Colour	Packaging
4 Pair	399 1111 AG1	PVC	Grey	305m box
	399 1111 AG8	PVC	Grey	305m reel
	399 1111 AG5	PVC	Grey	500m reel
	399 1111 AG6	PVC	Grey	1000m reel
	399 1611 AO1	LSZH	Orange	305m box
	399 1611 AO8	LSZH	Orange	305m reel
	399 1611 AO5	LSZH	Orange	500m reel
	399 1611 AO6	LSZH	Orange	1000m reel

Temperature rating

Installation	-10 to +50°C
Operation	-10 to +40°C



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All information is subject to change without prior notice (UTP Category 6 March '98)