Category Cable Myths and Legends

The frequency chart on the left side shows the true certification frequency for each level. Do you see a 350 MHz for Category 5e? Do you see a 500 or 550 MHz for Category 6? No you do not. These commonly marketed thresholds have no official meaning per the certification standards. This is a game of marketing to try to differentiate cables from other suppliers. Under ANSI/TIA and ISO/IEC – only the worst case performance can be presented. However the sweep above the official certification threshold has no such limitation and manufacturers and distributors are free to exaggerate and manipulate at will.

Frequency	TIA-568C	ISO/IEC	System Standard	Connector	Comment
16 MHz	Category 3	Class C	10BaseT	8P8C	Also for Phone and Voice applications
100 MHz	Category 5e	Class D	100BaseT	8P8C	Can support Gigabit Ethernet if properly tested and certified
250 MHz	Category 6	Class E	1000BaseT	8P8C	Gigabit Ethernet, can support 10 Gigabit Ethernet to 55m if properly tested and certified
500 MHz	Category 6A	Class E_A	10GBaseT	8P8C	10 Gigabit Ethernet
600 MHz	None	Class F	10GBaseT	8P8C* or TERA	Often referred to as "Category 7" cable. This is a 10 Gigabit Infrastructure cable
1000 MHz	None	Class F_A	40G	8P8C* or TERA	Often referred to as "Category 7E" cable. This is a 40 Gigabit Infrastructure cable and can support 100G in short lengths

* 8P8C connectors cannot support the full range of the Class F and F_A cables. TERA connectors must be used to achieve top results.

There is one specification that can be used to determine a better cable from a poor one. Every Category cable specification sheet should contain performance numbers for the benchmarks directed by the TIA/EIA. Here is an example of the test data usually provided with the cable specification.

FREQ (MHz)	Insertion Loss (dB/100m)	NEXT (dB)	PSNEXT (dB)	ACR (dB/100m)	PSACR (dB/100m)	ELFEXT (dB/100m)	PSELFEXT (dB/100m)	RL (dB)
	Max.	Min.	Min.	Min.	Min.	Min.	Min.	Min.
0.772	1.8	67.0	64.0	65.2	62.2	66.0	63.0	19.4
1.0	2.0	65.3	62.3	63.3	60.3	63.8	60.8	20.0
4.0	4.1	56.3	53.3	52.2	49.2	51.7	48.7	23.0
8.0	5.8	51.8	48.8	46.0	43.0	45.7	42.7	24.5
10.0	6.5	50.3	47.3	43.8	40.8	43.8	40.8	25.0
16.0	8.2	47.3	44.3	39.1	36.1	39.7	36.7	25.0
20.0	9.3	45.8	42.8	36.5	33.5	37.7	34.7	25.0
25.0	10.4	44.3	41.3	33.9	30.9	35.8	32.8	24.3
31.25	11.7	42.9	39.9	31.2	28.2	33.9	30.9	23.6
62.5	17.0	38.4	35.4	21.4	18.4	27.8	24.8	21.5
100.0	22.0	35.3	32.3	13.3	10.3	23.8	20.8	20.1

The ACR specification can tell you a good cable from a bad one. Attenuation to Crosstalk Ratio is a mathematical calculation where insertion loss is subtracted from crosstalk. As long as that number stays positive you have a signal pipe. When it reaches zero, the pipe is effectively closed. There are devices that can use negative ACR but we're talking cable here. In order to show superior cable performance the supplier adds a second column to each specification. This is their typical cable performance. They have to show the worst case, usually the standard itself in the one column and then can provide their data for the second column. The cable supplier may supply this type of chart instead:

FREQ (MHz)	Insertion Loss (dB/100m)		NEXT (dB)		PSNEXT (dB)		ACR (dB/100m)		PSACR (dB/100m)		ELFEXT (dB/100m)		PSELFEXT (dB/100m)		RL (dB)	
	Max.	Typ	Min.	Typ	Min.	Typ	Min.	Typ	Min.	Typ	Min.	Typl	Min.	Typ	Min.	Typ
1.0	2.0	1.7	65.3	83.1	62.3	76.8	63.3	81.4	60.3	75.1	63.8	84.8	60.8	76.5	20.0	35.7
4.0	4.1	3.6	56.3	74.8	53.3	67.8	52.2	71.2	49.2	64.2	51.7	74.2	48.7	65.3	23.1	39.1
8.0	5.8	5.1	51.8	70.0	48.8	63.4	46.0	64.9	43.0	58.3	45.7	68.1	42.7	59.2	24.5	36.3
10.0	6.5	5.7	50.3	68.6	47.3	61.7	43.8	62.9	40.8	56.0	43.8	66.5	40.8	57.4	25.0	35.1
16.0	8.2	7.3	47.3	63.4	44.3	57.4	39.1	56.1	36.1	50.1	39.7	61.4	36.7	53.2	25.0	36.0
20.0	9.3	8.3	45.8	63.7	42.8	57.6	36.5	55.4	33.5	49.3	37.7	59.7	34.7	51.3	25.0	37.5
25.0	10.4	9.3	44.3	61.0	41.3	54.3	33.9	51.7	30.9	45.0	35.8	56.8	32.8	48.9	24.3	37.7
31.25	11.7	11.1	42.9	60.7	39.9	53.7	31.2	49.6	28.2	42.6	33.9	53.3	30.9	45.6	23.6	34.8
62.5	17.0	15.0	38.4	55.4	35.4	49.3	21.4	40.4	18.4	34.3	27.8	47.9	24.8	40.2	21.5	34.1
100.0	22.0	19.3	35.3	51.9	32.3	45.2	13.3	32.6	10.3	25.9	23.8	43.3	20.8	35.7	20.1	32.3
155.0		23.7		50.0		43.0		26.3		19.3		40.0		31.0		
200.0		27.5		47.0		40.0		19.5		12.5		37.0		29.0		
250.0		31.1		44.0		37.0		12.9		5.9		35.0		27.0		
350.0		37.4		41.0		34.0		3.6		-3.4		31.0		24.0		

Notice this cable performance chart indicates a positive ACR to 350 MHz. That is a good cable as few cables can reach this type of performance. The cable that this sweep came from is not going to be found on a discount website or supplier. This is good stuff. Many really marginal cables will not even have an ACR column, because they don't want to show how bad the cable really is. Buyers beware if the ACR specification is missing! You do not find quality cable at cheap prices.

Do you have any questions or feedback? E-mail Ralph Parrett @ rparrett@libav.com for comments.