Additional Receiver test

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It has been suggested that the Receiver interference tolerance test is not complete enough, especially for a normative spec. The original presentation on interference tolerance testing (moore_02_0704) recommended that more than 1 test be done with different channels to avoid “designing around the specification”. I think that more than one test will be necessary properly to test the KR Rx but that the receivers for KX and KX4 will be simple enough to need only a single test.

I propose that we add a second test for KR. In the second test I propose that we use a channel with an attenuation scaled from $A_{max.}$ This can be accomplished by changing the limit on the value m_{CT} which is defined in 69A. equation 5. When the test channel is changed, the “Amplitude of broadband noise (RMS)” should be change as well. I generated the table below to help guide me to the correct amplitude for a scaled channel.

In this table:
m_{CT} represents the channel scale factor. Very roughly, if a m_{CT} of 1.0 represents a 1m line, a m_{CT} value of 0.5 represents a 50cm line etc.

To compute min Noise and max Noise for a channel, I performed a power integral of the product of:

A sinc function to represent the data pulse
A Gaussian to represent transition time
An equalization function to represent the frequency response due to Tx equalization
A channel gain which is the inverse dB of $-m_{CT} * A_{max} - ICR_{min}$
I used 2 ICR_{min} curves, one from D3.0 and one from baumer_01_0906 Option 2.

To get min Noise I used minimum Tx output level, maximum transition time, and, for KR, equalization of (-.125,.75,-.125).

To get max Noise I used maximum Tx output level, minimum transition time, and, for KR, no equalization.

For KX4 I always use 3dB Tx equalization and for KX, no equalization.

To get PulseGain I took an integral of the inverse dB of $-m_{CT} * A_{max}$ times a sinc function and for KX4 an equalization function.

Port type	m_{CT}	ICRmin curve	PulseGain	min Noise	max Noise	spec
KR	1.0	D3.0	.280	4.3mV	9.7mV	5.2mV
KR	1.0	Option 2	.280	6.7mV	16.2mV	5.2mV
KR	0.5	D3.0	.509	10.1mV	21.8mV	
KR	0.5	Option 2	.509	15.0mV	35.1mV	
KR	0.25	D3.0	.529	16.6mV	36.1mV	
KR	0.25	Option 2	.529	25.6mV	74.2mV	
KX4	1.0	D3.0	.455	4.6mV	8.1mV	8.1mV
KX4	1.0	Option 2	.455	10.1mV	16.6mV	8.1mV
KX	1.0	D3.0	.706	3.1mV	8.6mV	8.6mV
KX	1.0	Option 2	.706	14.0mV	30.8mV	8.6mV

Based on this I recommend that we add a test for 10GBASE_KR with a minimum of m_{CT} of 0.5 and Amplitude of broadband noise of 21.8 mV RMS. In the event that a higher ICR_{min} is accepted, this could drop to 10.1mV RMS.

An alternative is hat we add a test for 10GBASE_KR with a minimum of m_{CT} of 0.25 and Amplitude of broadband noise of 36.1 mV RMS. In the event that a higher ICR_{min} is accepted, this could drop to 16.6mV RMS.

Implementation would consist of:

In 69A.2.2 Page 186, Line 13, change: "The test channel shall have m_{TC} greater than 1.0." to "The test channel shall have mTC greater than the value specified for the test to be performed."

In Tables 70-7, 71-7, and 72-10, add lines specifying minimum m_{TC} of 1.0.
In clause 72.7.2.1 Page 116 Line 3, replace:

"The receiver interference tolerance shall be measured as described in Annex 69A with the parameters specified in Table 72-10. The receiver shall satisfy the requirements for interference tolerance specified in Annex 69A."

to:

"The receiver interference tolerance shall be measured as described in Annex 69A with the parameters specified in Table 72-10 and with the parameters specified in Table 72-11. The receiver shall satisfy the requirements for interference tolerance specified in Annex 69A for both tests."

Add a Table 72.11 like Table 72.10 except specifying minimum m_{TC} of 0.5 and with an appropriate Amplitude of broadband noise.