Howard and all,

First of all, my apologies for jumping in somewhat late on this discussion. I appreciate all the work that has gone into 10GBASE-CX4 to date, and I hope my comments will be received as they are intended -- as constructive.

I will list several specific comments below, but my overall not-so-hidden agenda is to persuade the group not to abandon the XAUI compliance interconnect concept and to avoid required TX near-end measurements. I offer three reasons for this:

1. (The practical reason) Near-end TX waveforms have maximum high frequency content, exciting any and all fixture resonances. Hence near-end measurements -- especially with restrictive templates -- can be a nightmare of small excursions outside the template. Yet these high frequency aberrations are attenuated by the transmission path and affect the far-end signal quality very little if at all. Far end measurements are much more benign and to the point.
2. (The theoretical reason) A jitter budget, with jitter increasing down the transmission path made sense for trapezoidal waveforms, but not for pre-emphasized TX waveforms. With pre-emphasis, the jitter can be better at the far end of the path than at the TX output. Specifying such TX waveforms to guarantee an adequate RX waveform is complex and sensitive to assumptions.
3. (The time-to-market reason) It appears inevitable that the RX will require additional equalization compared with XAUI. Hence, keeping the TX specifications as close as possible to XAUI(at least in format) would seem to offer the lowest risk, fastest route to market for 10GBASE-CX4.

For what it's worth, a compliance channel approach to TX specs would also render the issue of minimum TX amplitude irrelevant.

Here are some specific comments on sections of the draft:

- **54.7.3.2 Load** For accurate measurements of 3.125 Gb/s signals, especially at the TX, 2.5 GHz is probably not adequate bandwidth. (At the far end, after 12 or 20 dB of attenuation at these frequencies, this is much less of an issue.)
- **54.7.3.4 Output Impedance** and **54.7.4.5 Input Impedance** I realize these sections are out of XAUI, but I would like to point out that the values specified (if my math is correct) are equivalent to 1.04 pF of dif'l load capacitance on the TX and 0.424 pF of dif'l load capacitance on the RX. These would be problematic limits.
- **54.7.3.6 Differential Output Template** (I gather there has already been discussion on this item, but I'll add my two cents.) This template is unworkably tight. The definition of normalized amplitude guarantees that the waveform will never exceed +/-1, so template values outside that range are meaningless. This leaves a mere 7 percent of peak-peak amplitude -- 3.5% at each extreme -- as a target. With resonances and +/-5% load tolerances, this won't work. The implied risetimes are also unrealistic. The slowest risetime of a trapezoidal signal that

would fit within the template would have a risetime of 101.4 ps. Realistic, curved waveforms would need to be even faster. *Of course, all these problems go away with the compliance interconnect approach.*

- **54.7.3.7 Transmitter Jitter** The added requirement on the mean of jitter distributions will probably invalidate a number of existing jitter measurement approaches. A lot of capital equipment might be obsoleted with this additional requirement.
- **54.8.2 Cable Assembly Insertion Loss** Just some questions here. I do not understand the relevance of the 1/sqrt(f) term. This is large at low frequency and smaller at higher frequencies. Also, it should be stated that "f" in the expression is in units of Hz. Also, I believe the inequality is in the wrong direction. And, lastly, the sentence ending "...deviate by more than 10% from equation 54.3." might need some explaining. 54.3 is, after all, an inequality. Does this allow +/- 10% deviation from the right hand side expression? Or only -10%?