

Date: July 17, 2006

To: Harvey Newman and all T10 Members

From: Steve Finch, STMicroelectronics

Subject: Start-up Training Sequence Proposal, New Configuration Window

Document: T10/06-354r0

Reference: T10/05-397r5

(I've attempted to use the same terminology as used in 05-397r5. These terms are indicated by quotes.)

I think we are headed in the right direction with the decision to pursue an OOB like method to communicate speed capabilities after the GEN1 and GEN2 speed windows.

I have a few ideas that I'd like to share in regards to the format of this new window. I wrote them down to see if others think these are good or bad ideas.

Maybe we can discuss them at one of the conference calls.

When to start transmitting in the “new configuration window”?

In SAS-1.1, after the speed negotiation window for GENx ended we delayed RCD time and then started transmitting ALIGN0s at GENx+1. One of the reasons the RCD delay (750,000 OOBI, or about 509 microseconds) was included was to allow the clock system to be switched and stabilize before starting to transmit at the new speed.

The current proposal for the “new configuration window” indicates that these transmissions would be at GEN1 rate (see page 10 of 05-397r5). If the phy participated in the GEN2 window, then it would (should?) switch back to GEN1 speeds for the new configuration window. Shouldn't we maintain the same RCD delay before sending this information as we are switching from GEN2 to GEN1.

PROPOSAL: We require the RCD from the end of the GEN2 window to the start transmitting the “data” in the “new configuration window”.

What is the method of transmission of “data” in the “new configuration window”?

Negation times for COMWAKE, COMINIT and COMSAS are all less than or equal to 2400 OOBI (or 1.6 microseconds). The “shall not detect” time for COMWAKE is 1.575 microseconds. This means that any time we have an idle time greater than 1.6 microseconds we will not have any possibility that COMWAKE, COMINIT or COMSAS could be inadvertently detected. If we make sure all idle times are a minimum of 2 microseconds we should be safe from any false detections.

PROPOSAL: Any idle time during the “data” portion of the “new configuration window” shall be a minimum of 2 microseconds. (3000 OOBI is 2 microseconds, and is 75 dwords.)

If we delay the start of transmitting the “new configuration window” for RCD and still want to maintain the “speed negotiation window time” (total window width) of 913,340 OOBI (RCD + SNTT or about 509 microseconds), then we have only 109 microseconds (SNTT = 163,840 OOBI) for transmitting the “data” in the “new configuration window”. During this time, it is desired to transfer some number of “bits” of data.

Assuming:

- a) a bit time of 2 microseconds,
- b) a “zero” is a lack of transmission (idle time) and a “one” is the transmission of the burst pattern, and
- c) we desire to stay within the transmission window established by SNTT,

then, if we divide the SNTT time (109 microseconds) by the 2 microseconds bit time, we have an opportunity to transmit approximately 50 bits.

PROPOSAL: A bit time during the “new configuration window” shall be 2 microseconds (or 3000 OOBI or 75 dwords).

What is the format of the “data”?

During the RCD time before the “data” in the “new configuration window”, we had a long period of idle time. The transmission of a “one” in the first bit period of the “data” could indicate the start of the “data”. This can provide a point of reference (synchronization) that could be beneficial.

The information we need to exchange can likely be divided into fields, much like we have fields in various frames. Some of the possible data fields are:

- (a) Minimum non-SSC speed
- (b) Maximum non-SSC speed
- (c) Minimum SSC speed
- (d) Maximum SSC speed

These may or may not be the fields we need and obviously other fields could be added, but they are a set that I selected for the example transmission pattern given below.

Since the Connection Rate field in the Open Address Frames is 4 bits, I use a field width of 4 bits for the previously mentioned fields.

If we separate each field with a “01” bit synchronization sequence, the receiver can use these patterns to “confirm” that it is maintaining synchronization with the transmitter and could use this to make minor adjustments in its timers to maintain synchronization during the “data” window.

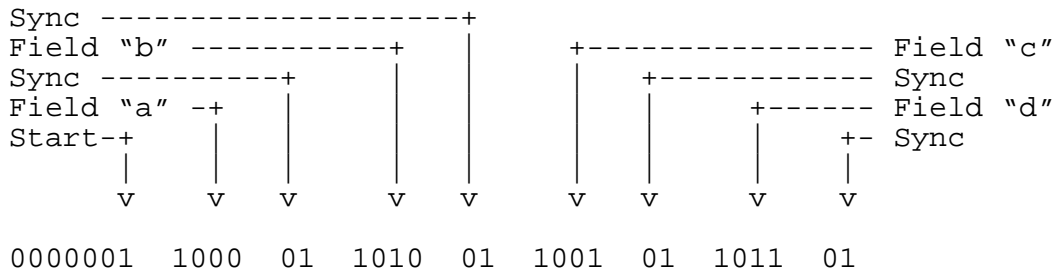
If all of the above ideas are used, a burst would communicate the following:

-----1aaaa01bbbb01cccc01dddd01

where:

- is the idle time during RCD
- 1 is a burst for a bit time
- 0 is idle for a bit time
- a is a bit of Minimum non-SSC speed, idle if zero, burst if one
- b is a bit of Maximum non-SSC speed, idle if zero, burst if one
- c is a bit of Minimum SSC speed, idle if zero, burst if one
- d is a bit of Maximum SSC speed, idle if zero, burst if one

If "a" were "1000" (8 = GEN1), "b" were "1010" (10 = GEN3), "c" were "1001" (9 = GEN2) and "d" were "1011" (GEN4?), then the sequence would look like this:



where:

- "0" is a 2 microsecond idle time,
- "1" is a 2 microsecond burst, and
- (spaces are used to separate fields for us humans but represents no time)

This sequence of data would utilize 25 of the 50 available bits. Obviously, more or different fields could be used and some of the 50 bits could be reserved for future use.

Okay!? Now for a series of proposals that "divide the question" into as much granularity as I thought might be useful. The idea is that we can quickly decide where the issues are and where we have agreement.

PROPOSAL: During the "data" in the "new configuration window", an idle time of 2 microseconds shall represent a value of "0" and a burst time of 2 microseconds shall represent a "1".

PROPOSAL: The "data" in the "new configuration window" shall not contain more than 50 bits.

PROPOSAL: The first bit of the "data" in the "new configuration window" shall be a "1".

PROPOSAL: The remaining bits of the "data" in the "new configuration window" shall be divided into "fields" of one or more bits.

PROPOSAL: Each field within the “data” in the “new configuration window” shall be terminated by a “01” sequence.

PROPOSAL: The first four fields in the shall be:

- (a) Minimum non-SSC speed
- (b) Maximum non-SSC speed
- (c) Minimum SSC speed
- (d) Maximum SSC speed

and

- (a) each field shall be 4 bits in length, and
- (b) shall contain the same values as defined for the Connection Rate field of the Open Address Frame.