

Interpretation Number: 1-11/04
Topic: 1Gb/s Pause resolution
Relevant Clause: 37
Classification: Unambiguous

Interpretation Request

We have found what we believe to be a small anomaly between "Table 37-4 Pause priority resolution" on page 85 of IEEE Std 802.3-2002 and "Table 37-2 Pause encoding" on page 81. I have scanned through the errata and the published interpretations, and I have found no references to this issue.

The problem is that the meaning of PAUSE = 1 and ASM_DIR = 1 in Table 37-2 appears to be somewhat ambiguous, and this leads to potentially conflicting interpretations that affect Table 37-4.

Table 37-2 says that "1 1" means "Both Symmetric PAUSE and Asymmetric PAUSE toward local device," but the text below the table clearly states that when ASM_DIR is set, the PAUSE bit merely indicates the direction in which PAUSE is supported on the link, and thus does not indicate support for symmetric PAUSE.

In other words, at least by the 37.2.1.4 text on page 81, "1 1" means "Asymmetric PAUSE toward local device."

With that interpretation, Table 37-4 becomes a problem. The problem is in the 6th and 9th entries in that table. These are reproduced in text form below.

Local Device		Link Partner		Local Resolution	Link Partner Resolution
PAUSE	ASM_DIR	PAUSE	ASM_DIR		
1	0	1	-	Enable PAUSE Transmit and Receive	Enable PAUSE Transmit and Receive
1	1	1	-	Enable PAUSE Transmit and Receive	Enable PAUSE Transmit and Receive

In the first case, this allows both "1 0 1 0" and "1 0 1 1" states to resolve with PAUSE in both directions. For "1 0 1 0," this makes sense, as both sides are advertising symmetric PAUSE capability. However, for "1 0 1 1," this would does not make sense. The local device is advertising symmetric PAUSE, but the link partner is saying that it supports only PAUSE receive, and not PAUSE transmit.

If the text below Table 37-2 were correct, I believe that "1 0 1 1" ought to resolve in a manner similar to "1 0 0 1" -- that is, if the link partner can support only asymmetric PAUSE, then none is possible.

The second case allows both "1 1 1 0" and "1 1 1 1." For the same reasons as above, I think that "1 1 1 0" would resolve as "Disable PAUSE Transmit and Receive." For "1 1 1 1," both sides are advertising the PAUSE receive capability, but neither is advertising PAUSE transmit. This would also be a "Disable PAUSE Transmit and Receive" result.

If, however, the text in 37.2.1.4 is misleading (and should instead indicate that all devices that support PAUSE receive *must* also support PAUSE transmit, and that the PAUSE bit does not just indicate direction but always signals the ability to transmit PAUSE frames), then both Table 37-2 and 37-4 are right.

My suspicion at this point is that the tables are right, the text is misleading, and that the ability to transmit PAUSE frames is the logical "OR" of the PAUSE and ASM_DIR bits - - when either is set, PAUSE transmit is available -- and that the ability to receive PAUSE frames is indicated by the PAUSE bit alone. Such an interpretation allows these two capabilities to function in a manner similar to other capability bits.

Interpretation for IEEE Std 802.3-2002

The requester is misinterpreting the text under Table 37-2. The text does not say that the Pause bit "merely" indicates the direction in which PAUSE is supported.

The text states:

"The PAUSE bit indicates that the device is capable of providing the symmetric PAUSE functions as defined in Annex 31B. The ASM_DIR bit indicates that asymmetric PAUSE operation is supported. The value of the PAUSE bit when the ASM_DIR bit is set indicates the direction PAUSE frames are supported for flow across the link."

This last sentence is an indication of the "direction" of the asymmetric PAUSE "should" the devices resolve to "only" using asymmetric PAUSE. This does not restrict the advertisement. This does not say that both capabilities can't be advertised at the same time. This does not say that advertising asymmetric PAUSE negates the advertisement of symmetric PAUSE. This becomes even more clear when looking at Table 37-4.

Entry 4 in this table is a good example. The local device is advertising that it only supports asymmetric PAUSE toward the link partner - "01". Thus, when the link partner advertises both symmetric PAUSE and asymmetric PAUSE toward itself - "11", since the local device only supports asymmetric PAUSE then the link partner uses the asymmetric PAUSE portion of its advertisement and resolves to asymmetric PAUSE toward the link partner.

Entry 6 in this table is another example. The local device is advertising that it supports both symmetric PAUSE and asymmetric PAUSE toward itself - "11". Thus, when the link partner advertises either that it supports only symmetric PAUSE - "10" or both

symmetric PAUSE and asymmetric PAUSE toward itself - "11", they can't resolve to asymmetric PAUSE since the direction they are both advertising is opposite to each other so they must resolve to symmetric PAUSE.

Other entries are resolved in a similar fashion.