IEEE 802.3 Interpretations Report

July 15th, 2004
Portland, OR

David Law

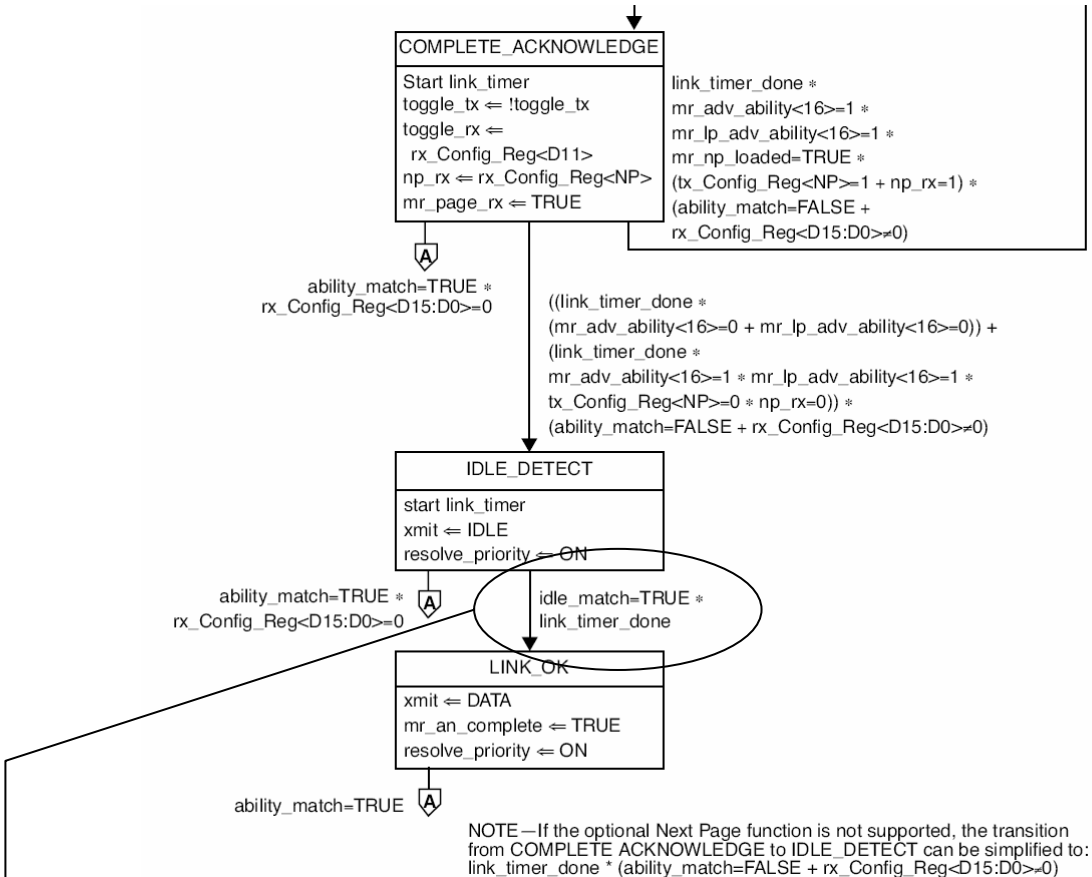
Interpretation Number: 1-07/04
Topic: Auto-Negotiation state diagram
Relevant Clause: Figure 37-6

Interpretation Request

My question is regarding the IEEE802.3z referring to figure 37-6.

I was wondering if anyone can help me with a problem I face. In the IEEE 802.3z figure 37.6 auto negotiation block diagram, in the IDLE_DETECT state, we are expecting IDLE symbol and also link time done to move to LINK_OK state. Let's say one of the link partner link timer is 10.5ms and the other is 11.5ms. So what will happen is the link partner with timer of 10.5ms will go to the LINK_OK state first while the link partner with timer of 11.5ms will still be in the IDLE_DETECT state.

My question is when the first link partner goes into the LINK_OK and sends data to the link partner that's still in the IDLE_DETECT. What should happen? Should the MAC device in IDLE_DETECT resets or proceed on?



link_timer

Timer used to ensure Auto-Negotiation protocol stability and register read/write by the management interface.

Duration: 10 ms, tolerance +10 ms, –0 s.

idle_match

For a stream of /C/ and /I/ ordered_sets, this function continuously indicates whether three consecutive /I/ ordered_sets have been received. The match count is reset upon receipt of /C/.

Values: FALSE; Three consecutive /I/ ordered_sets have not been received (default).
TRUE; Three consecutive /I/ ordered_sets have been received.

NOTE—Idle_match is set by this function definition; it is not set explicitly in the state diagrams. Idle_match evaluates to its default value upon state entry.

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Topic:	Auto-Negotiation state diagram
Relevant Clause:	Figure 37-6
Classification:	Unambiguous

The state IDLE_DETECT does not relate to the MAC but instead the PHY.
As defined in Fig 37-6 the transition from IDLE_DETECT to LINK_OK requires idle_match=TRUE * link_timer_done. The condition idle_match=TRUE is defined in 37.3.1.2 as "Three consecutive /I/ ordered_sets have been received. The match count is reset upon receipt of /C/.". If the link partner's timer is 10.5 msec, that link partner has sent plenty of /I/ ordered_sets to make this condition valid. Packets transmitted from the link partner, which do not include /C/, will not reset idle_match. Therefore received frames will be ignored while this PHY's link timer is timing out for another 1 msec, but then the state diagram does indeed proceed on to the LINK_OK state.

Interpretation Number: 2-07/04

Topic: Far-End fault

Relevant Clause: 24.3.2.1

Classification:

Interpretation Request

It seems from this clause (and from clause 28) that auto-negotiation is not possible for 100Base-FX interfaces. Is it right?

Moreover, the clause specifies that the FEF shall not implemented for media capble of supporting Auto-Negotiation. It is not clear to me whether we have 100Base-Tx with auto-negotiation disabled, whether or not the FEF can be implemented or not.

If the FEF can be implemented in 100Base-Tx when auto-negotiation is disabled, is there something similar for 100Base-X interfaces?

28.1.4 Compatibility considerations

The Auto-Negotiation function is designed to be completely backwards compatible and interoperable with 10BASE-T compliant devices. In order to achieve this, a device supporting the Auto-Negotiation function must provide the NLP Receive Link Integrity Test function as defined in Figure 28–17. The Auto-Negotiation function also supports connection to 100BASE-TX and 100BASE-T4 devices without Auto-Negotiation through the Parallel Detection function. Connection to technologies other than 10BASE-T, 100BASE-TX, or 100BASE-T4 that do not incorporate Auto-Negotiation is not supported.

Implementation of the Auto-Negotiation function is optional. For CSMA/CD compatible devices that use the eight-pin modular connector of ISO/IEC 8877: 1992 and that also encompass multiple operational modes, if a signaling method is used to automatically configure the preferred mode of operation, then the Auto-Negotiation function shall be used in compliance with Clause 28. If the device uses 10BASE-T compatible link signaling to advertise non-CSMA/CD abilities, the device shall implement the Auto-Negotiation function as administered by this specification. All future CSMA/CD implementations that use an eight-pin modular connector shall be interoperable with devices supporting Clause 28. If the implementor of a non-CSMA/CD eight-pin modular device wishes to assure that its operation does not conflict with CSMA/CD devices, then adherence to Clause 28 is recommended.

24.3.2.1 Far-End fault

Auto-Negotiation provides a Remote Fault capability useful for detection of asymmetric link failures; i.e., channel error conditions detected by the far-end station but not the near-end station. Since Auto-Negotiation is specified only for media supporting eight-pin modular connectors, such as used by 100BASE-TX over unshielded twisted pair, Auto-Negotiation's Remote Fault capability is unavailable to other media for which it may be functionally beneficial, such as 100BASE-TX over shielded twisted pair or 100BASE-FX. A remote fault capability for 100BASE-FX is particularly useful due to this medium's applicability over longer distances (making end-station checking inconvenient) and for backbones (in which detection of link failures can trigger redundant systems).

For these reasons, 100BASE-X provides an optional Far-End Fault facility when Auto-Negotiation cannot be used. Far-End Fault shall not be implemented for media capable of supporting Auto-Negotiation.

Interpretation Number:	2-07/04
Topic:	Far-End fault
Relevant Clause:	24.3.2.1
Classification:	Unambiguous

The second sentence of the second paragraph of subclause 28.1.4 'Compatibility considerations' states 'For CSMA/CD compatible devices that use the eight-pin modular connector of ISO/IEC 8877: 1992 and that also encompass multiple operational modes, if a signalling method is used to automatically configure the preferred mode of operation, then the Auto-Negotiation function shall be used in compliance with Clause 28.' Furthermore the second sentence of the second paragraph of subclause 24.3.2.1 'Far-End fault' clearly states that 'Far-End Fault shall not be implemented for media capable of supporting Auto-Negotiation.'.

Hence 100BASE-TX operation over unshielded twisted pair, which utilises the eight-pin modular connector, is capable of supporting Auto-Negotiation and therefore implementation of Far-End fault is prohibited. 100BASE-TX operation over shielded twisted pair, which does not utilise the eight-pin modular connector, and 100BASE-FX are both not capable of supporting Auto-Negotiation and therefore implementation of Far-End fault is permitted.

Interpretation Number: **3-07/04**
Topic: **Isolation**
Relevant Clause: **33.4.1**

Interpretation Request

The standard that we need to better understand is 33.4.1 "Isolation", and I have a few questions that may guide the interpretation the way we need it:

1) Clause 33.4.1 a) states that the electrical strength test should withstand "1500Vrms steady state at 50-60 Hz for 60 second" and then it refers to clause 6.2 of IEC 60950-1:2001.

2) First of all, we assume that the electrical strength test will be performed between input side of the converter (main supply side) and the output side of the isolated converter (Load side). Is this correct?

3) Clause 6.2.1 b) of IEC 60950-1:2001 categorize "parts that can be touched by the test finger" like our DC/DC Converter. Our converter is not on the category 6.2.1 a) where the part would be "expected to be held or touched during normal use (for example, a telephone handset or a keyboard)". Then clause 6.2.2.2 steady-state test states, "The electrical separation is subjected to an electric strength test according to 5.2.2" (where the a.c. test voltage for 6.2.1 b) is 1000Vrms). Is this applicable to our DC/DC converter? That is, can we test our converter's isolation from input to output with 1000Vrms instead of 1500Vrms and still meet the standard 33.4.1?

4) Then on Test Procedure clause 5.2.2 of IEC 60950-1:2001 (referenced on 6.2.2.2) it is stated "The insulation is subjected either to a voltage of substantially sine-wave form having a frequency of 50Hz or 60Hz, or to a DC voltage equal to the peak voltage of the prescribed a.c. test voltage". Is this applicable to our DC/DC converter? That is, can we test our converter's isolation from input to output with a DC voltage equal to the peak voltage of the prescribed a.c. test voltage?

5) On clause 5.2.2 of IEC 60950-1:2001 Note 2 it is stated "Where there are capacitors across the insulation under test it is recommended that d.c. Test voltages are used". We do have a common mode capacitor electrically connected in between the input side of the converter (main supply side) and the output side of the isolated converter (Load side). As before, can we test our converter's isolation from input to output with a DC voltage equal to the peak voltage of the prescribed a.c. test voltage?

6) On clause 5.2.2 of IEC 60950-1:2001 Note 1 it is stated, "For routine tests it is permitted to reduce the duration of the electric strength test to 1 second". Is this applicable to our DC/DC converter? That is, can we test our converter's isolation from input to output on production tests for 1 second instead of 60 seconds and still meet the standard 33.4.1? Page 1 of 2

7) On clause 5.2.2 of IEC 60950-1:2001 it is stated "Corona discharge or a single momentary flashover is not regarded as insulation breakdown". Is this clause applicable to our DC/DC converters?

Interpretation Number:	3-07/04
Topic:	Isolation
Relevant Clause:	33.4.1
Classification:	Unambiguous

The first two sentences of subclause 33.4.1 state 'The PSE shall provide electrical isolation between the PI device circuits, including frame ground (if any), and all PI leads. The PD shall provide electrical isolation between all external conductors, including frame ground (if any), and all PI leads.'. This places the requirement for isolation between the PI leads and the frame ground, if any, and also the PI device circuits in the case of a PSE.

IEEE Std 802.3 Clause 33 doesn't specify DC/DC converters. In Clause 33 we are specifying PD and PSE devices. Subclause 33.4.1 says clearly where the isolation requirement applies.

In respect to the questions related to 60950, these do not constitute a requests for interpretation of IEEE Std 802.3 but rather a request for consultation advice.

IEEE 802.3 Motion

IEEE 802.3 approves the proposed Interpretation responses to Interpretation requests 1-07/04, 2-07/04 and 3-07/04 as presented without the need for a 30 day letter ballot.

M: David Law S: Steve Carlson Tech 75%/~~Proc 50%~~

PASSED/FAILED Date:

Y: N: A: Time: