Cl **148** *SC* **148.1** *P* *L* # r01-211

Thompson, Geoffrey Independent Consultant

Comment Type **ER** *Comment Status* **A** *PLCA_Overview*

The new text is much better. I believe it needs a few tweaks which I believe should be acceptable to the group.

SuggestedRemedy

Change the 1st paragraph of the text to read: This clause specifies <DEL: "a"> <INSERT: "an augmented"> reconciliation sublayer to provide optional Physical Layer Collision Avoidance (PLCA) capabilities among participating stations. The PLCA RS is specified for operation with Clause 147 (10BASE-T1S) PHYs operating in half-duplex multidrop mode. PLCA can be dynamically enabled or disabled via management interface. <INSERT: "When PLCA is disabled or the PHY is in full duplex mode, the reconciliation sublayer function specified in clause 22 is used.">

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Add the following final sentence to 1st paragraph of 148.1:
<INSERT: "When PLCA is disabled, the reconciliation sublayer mapping is identical to that specified in clause 22.">

STRAW POLL #10:
I support the following proposed response:
"PROPOSED ACCEPT IN PRINCIPLE:
Add the following final sentence to 1st paragraph of 148.1:
"When PLCA is disabled, the reconciliation sublayer mapping is identical to that specified in clause 22."
Y:17
N:1
A:19

Cl **148** *SC* **148** *P* *L* # r01-218

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA_Scope*

Please consider this a "PILE ON" to Mr. Grow's comment i.47 on D3.0. I agree with the referred to comment in its entirety.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

Commenter provides no new information for the CRG to consider and the commenter has an already-existing DISAPPROVE vote.

Cl **148** *SC* **148** *P* *L* # r01-219

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA_Scope*

Please consider this a "PILE ON" to Mr. Grow's comment i.48 on D3.0. I agree with the referred to comment in its entirety.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

Commenter provides no new information for the CRG to consider and has an already-existing DISAPPROVE vote.

Cl **00** *SC* **0** *P* *L* # r01-220

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA*

Please consider this a "PILE ON" to Mr. Robinson's comment i.27 on D3.0. I agree with him that the layering of PLCA is incorrect and beyond the scope authorized in the PAR.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

Commenter provides no new information for the CRG to consider and has an already-existing DISAPPROVE vote.

Cl **148** *SC* **148** *P* *L* # r01-224

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA_Scope*

Please consider this a "PILE ON" to Mr. Kim's comment i.390 on D3.0. I agree with his comment.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

Commenter provides no new information for the CRG to consider and has an already-existing DISAPPROVE vote.

Cl **148** *SC* **148** *P* *L* # r01-225

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA_Scope*

Please consider this a "PILE ON" to Mr. Kim's comment i.393 on D3.0. I agree with his comment.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

Commenter provides no new information for the CRG to consider and has an already-existing DISAPPROVE vote.

Cl **30** *SC* **30.3.9.2.6** *P* *L* # r01-226

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA*

Please consider this a "PILE ON" to Mr. Kim's comment i.400 on D3.0. I agree with his comment. After 38+ years in the marketplace there is a significant amount of interlayer behavior that is unspecified but assumed and depended upon for Ethernet operation. Breaking those assumptions will have a severe negative impact on the Broad Market Potential.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter.

Comment #i-400 is: "Capability for aPLCAMaxBurstCount set to 255 packet bursts would significantly impact fairness ("multiple-access") and would cause upper layer protocol time-outs."

The response of the CRG to comment #i-400 is: "REJECT. The CRG disagrees with the commenter. The comment regarding upper layer protocols is protocol specific, which is outside the scope of IEEE 802.3. The commenter did not provide a proposed resolution in sufficient detail to readily determine the specific wording of changes that will cause him to change his vote to approve (see SASB Ops Manual clause 5.4.3.2,b)."

Additionally, related to this comment, r01-226:
Commenter provides opinion that he believes this may impact market adoption, but no new information related to the scope of "upper layer protocols" for the CRG to consider, nor does he provide additional information necessary for a sufficient remedy.

Straw Poll #8
I support the above proposed REJECT response to comment r01-226:
Y:23
N:2
A:13

Cl **00** *SC* **0** *P* *L* # r01-227

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA*

SCOPE OF DRAFT:<CR>One of the responsibilities as a balloter is to ensure that the scope of the draft (including the scope statement in the draft, if any) is within the scope of the work authorized by the PAR. <CR><CR>(From the IEEE-SA Ballot Instructions)<CR>An affirmative vote indicates your agreement that the scope of the draft does not exceed the work authorized by the PAR.<CR><CR>I vote DISSAPROVE ballot on the basis that the inclusion of clause 148 and its related text are beyond the scope of the approved PAR. The function of the specification of the shared media access method belongs within the boundaries of the Media Access Control sublayer of the ISO Data Link Layer per the long standing text in clauses 1.1.3.1 and 1.1.4.

SuggestedRemedy

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter, and believes the draft is within the PAR scope.
A key responsibility of the ballot pool is to evaluate whether the scope of the draft is within the scope of the PAR, and an affirmative vote indicates your agreement that the work does not exceed the scope of the PAR. The ballot pool has voted in the affirmative.

This comment is essentially a restatement of the arguments in previously rejected comments i-27 and i-270, and are not associated with a new disapprove vote.

The majority of the CRG believes that the functions are appropriately placed in the architecture of IEEE Std. 802.3 and ISO layering model.

Motion 7:
Move to strike, "The references to 1.1.3.1 and 1.1.4 provide no additional clarity or information. The referenced subclauses refer to the division of 802.3 on architectural lines, but do not provide any information on technical issues specifically in conflict with this draft." from the proposed response to comment r01-227.

M: G. Thompson
S: Y. Kim
(Technical >= 75%)
Y: 1
N: 13
A: 19

Motion 8:
Move to reconsider Motion 7.
M: Jon Lewis
S: David Brandt
(Procedural > 50%)
Y: 21
N: 1

Motion 9: Reconsideration of Motion 7:
Move to strike, "The references to 1.1.3.1 and 1.1.4 provide no additional clarity or information. The referenced subclauses refer to the division of 802.3 on architectural lines, but do not provide any information on technical issues specifically in conflict with this draft." from the proposed response to comment r01-227.
Y: 3
N: 17
A: 21
Motion Fails.

Motion 10:
I move to reject comment r01-227 with the following response:

REJECT.

The CRG disagrees with the commenter. The CRG disagrees with the commenter, and believes the draft is within the PAR scope.
A key responsibility of the ballot pool is to evaluate whether the scope of the draft is within the scope of the PAR, and an affirmative vote indicates your agreement that the work does not exceed the scope of the PAR. The ballot pool has voted in the affirmative.

This comment is essentially a restatement of the arguments in previously rejected comments i-27 and i-270, and are not associated with a new disapprove vote.

The references to 1.1.3.1 and 1.1.4 provide no additional clarity or information. The referenced subclauses refer to the division of 802.3 on architectural lines, but do not provide any information on technical issues specifically in conflict with this draft.

The majority of the CRG believes that the functions are appropriately placed in the architecture of IEEE Std. 802.3 and ISO layering model.

M: Peter Jones
S: Martin Miller
(Technical >= 75%)
Y: 5
N: 8
A: 22
Motion Fails

Motion 11:
Move to reconsider Motion 7.
M: Jon Lewis
S: Chris DiMinico
(Procedural > 50%)
Y: 23

N: 1
A:7
Motion Passes

Motion 12: Reconsideration of Motion 7:
Move to strike, "The references to 1.1.3.1 and 1.1.4 provide no additional clarity or information. The referenced subclauses refer to the division of 802.3 on architectural lines, but do not provide any information on technical issues specifically in conflict with this draft." from the proposed response to comment r01-227.
(Technical >= 75%)
Y: 18
N: 0
A: 16
Motion Passes

Motion 13:
I move to reject comment r01-227 with the following response:

REJECT.

The CRG disagrees with the commenter. The CRG disagrees with the commenter, and believes the draft is within the PAR scope.
A key responsibility of the ballot pool is to evaluate whether the scope of the draft is within the scope of the PAR, and an affirmative vote indicates your agreement that the work does not exceed the scope of the PAR. The ballot pool has voted in the affirmative.

This comment is essentially a restatement of the arguments in previously rejected comments i-27 and i-270, and are not associated with a new disapprove vote.

The majority of the CRG believes that the functions are appropriately placed in the architecture of IEEE Std. 802.3 and ISO layering model.

M: Jon Lewis
S: Tim Baggett
(Technical >= 75%)
Y: 19
N: 2
A: 11
Motion Passes

Cl **45** *SC* **45.2** *P* **42** *L* **1** # i-8

Rannow, R K self

Comment Type **GR** *Comment Status* **R** *Editorial*

verbose and confusing wording throughout Subclause 45.2

SuggestedRemedy

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The commenter did not provide a proposed resolution in sufficient detail to readily determine the specific wording of changes that will cause him to change his vote to approve (see SASB Ops Manual clause 5.4.3.2,b).

Cl **00** *SC* **0** *P* **1** *L* # i-27

Robinson, Gary RETIRED/unemployed

Comment Type **TR** *Comment Status* **R** *PLCA*

This standard is well written for its intended purpose but I do not believe it belongs as an amendment to 802.3 series.

This standard does not conform to the layer 1, 2, or 3 rules as the rest of 802.3.

Physical Layer Collision Avoidance (PLCA) when combined with CSMA/CD (which remains as an error handling function) constitutes a new Media Access Control (MAC) function and as such belongs in the MAC sublayer, not in the Physical Sublayer. Where such a function is appropriately placed is a matter of architecture, not implementation per clause 1.1.3 of the standard.

I would be satisfied if it was moved out of 802.3 and into 802.n or another series all together.

As the original contributor of CSMA/CD, 802.3 I have argued this issue before and I am sure it is not the last time.

SuggestedRemedy

I would be satisfied if it was moved out of 802.3 and into 802.n or another series all together.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The specification of PLCA is appropriately placed in the physical layer and carries out the operations delegated to the physical layer in the 802.3 architecture, providing mapping of PLS primitives to signalling for the PHY, and aligning the MAC data with the needs of the PHY. Nodes implementing the PLCA RS are interoperable on the same mixing segment with nodes without the PLCA RS implemented or enabled. The functions are located in the physical layer according to the definitions in ISO 7894-1:1994, which states that the physical layer provides "functional and procedural means to activate, maintain, and de-activate physical-connections for bit transmission between data-link-entities." (7.7.2), and that "functions may be provided by the (N)-layer to enhance the facilities offered to, and the quality of service seen by the (N+1)-entities over those which are offered to the (N)-layer by the (N-1)-layer" (5.3.3.1.2). The PLCA RS conforms to the Physical layer service specifications in IEEE 802.3 by interfacing with the MAC at the existing PLS_CARRIER, PLS_DATA_VALID, and PLS_SIGNAL primitives and providing the information necessary for the local MAC sublayer entity to perform media access functions. (IEEE Std 802.3-2018 6.2.3). The augmentation of the physical layer is consistent with prior augmentation of these primitives in IEEE Std 802.3 over its lifetime, but particularly the last 20 years. For further information, please see http://www.ieee802.org/3/cg/public/adhoc/brandt_020619_3cg_01a_adhoc.pdf

Move to accept the above proposed reject response to comment i-27:
M: C. Jones
S: V. Maguire

Y: 27
N: 4
A: 8

Cl **148** *SC* **148** *P* **214** *L* **1** # i-47

Grow, Robert RMG Con

Comment Type **TR** *Comment Status* **R** *PLCA_SCOPE*

The PLCA protocol is a MAC protocol. It is virtually identical to a token bus protocol (shared medium) I specified years ago. This clause violates 802.3 layering, and though considerable effort has been made to place this in the Reconciliation Sublayer, it doesn't change the fact that the functions are medium access control.

SuggestedRemedy

Delete Clause 148 and related text.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter's description of layering and the proper placement of PLCA in the layering model. PLCA performs the functions delegated by the 802.3 layer model to the physical layer - carrier sense and collision detection. Commenter seems to posit an implementation which is not described in the amendment, where the PLCA sublayer interfaces to the MAC via an MII. (a "top MII" per the commenter), whereas PLCA maintains the layering and communicates to the MAC via the primitives PLS_CARRIER and PLS_SIGNAL defined in IEEE Std 802.3, and communicates with the remainder of the physical layer through the MII interface. For more detail on how PLCA relates to OSI layering please see
http://www.ieee802.org/3/cg/public/adhoc/brandt_020619_3cg_01a_adhoc.pdf.

Additionally, the fact that PLCA-enabled half-duplex CSMA/CD stations may operate with and coexist with non-PLCA enabled half-duplex CSMA/CD stations on the same mixing segment is evidence that the PLCA RS is located beneath the CSMA/CD MAC and not a new MAC function in itself. See
http://www.ieee802.org/3/cg/public/Jan2019/Tutorial_cg_0119_final.pdf and
http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf
The PLCA working principle is to detect collisions (concurrent transmission of multiple stations on a shared network segment) in a logical sense. As an example, 10BASE-2 and 10BASE-5 detect concurrent transmissions by checking the DC voltage level on the shared media, that is detecting the superposition of multiple (not decodable) signals on the line. PLCA detects the very same concurrent transmissions by aligning the data conveyed by the local MAC to the unique transmit opportunity of the node and checking for concurrent reception of a packet. In such a way the collision does not result in "corrupting" the signal on the media. That is, the packet currently being transmitted is not interrupted, thus yielding the advertised network performance enhancement.

This is also in line with the ISO/OSI principle by which a layer may enhance the service it provides to the upper layer.
See http://www.ieee802.org/3/cg/public/adhoc/brandt_020619_3cg_01a_adhoc.pdf

Moreover the commenter is unclear as PLCA + CSMA/CD is obviously not identical to 802.4 Token Bus, and it is unclear what specification the commenter is referring to. For example, PLCA does not define any handshake protocol between nodes, it does not

generate packets and there is no concept of arbitration of the media. Additionally, CSMA/CD nodes with PLCA enabled interoperate properly with non-PLCA enabled nodes on the same network segment (without yielding the advertised gain in performance in this case). That would not be possible if nodes with PLCA enabled were not, in fact, using the CSMA/CD MAC protocol. See http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf.

Cl **148** *SC* **148** *P* **214** *L* **1** # i-48

Grow, Robert RMG Con

Comment Type **GR** *Comment Status* **R** *PLCA_SCOPE*

This clause specifies functionality that is outside the scope of the PAR. The result of out of scope content is that all interested parties may not have been aware of actual content and as a result enticed to join the ballot group.

SuggestedRemedy

Either delete the clause and related content, or revise the PAR, reform the ballot group, and restart Standards Association ballot.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter, and believes the draft is within the PAR scope. A key responsibility of the ballot pool is to evaluate whether the scope of the draft is within the scope of the PAR, and an affirmative vote indicates your agreement that the work does not exceed the scope of the PAR. The ballot pool has voted in the affirmative.

Cl **30** *SC* **30.2.2.2.1** *P* **0** *L* **0** # i-205

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA*

As I think I understand PLCA the occurance of collision at any point during reception is an error. If that is the case, then collision (in the presence of PLCA operation) should be added to the list of error statistics in this clause.

SuggestedRemedy

See comment.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. Collisions on the media in the presence of PLCA operation are already counted by the bits in register 3.2294.15:0 (see 45.2.3.68f.1). No change is required.

Cl **9** *SC* **9.1** *P* **30** *L* **8** # i-212

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *Multidrop*

Correction text is incorrect and baseline text is (now) incomplete.

SuggestedRemedy

Change text to read: "This clause specifies a repeater for use with half duplex IEEE 802.3 10 Mb/s baseband networks, with the exceptions of 10BASE-T1S (Clause 147). A repeater for any other IEEE 802.3 network type is beyond the scope of this clause."

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The commenter's suggested remedy goes beyond the scope of this amendment and potentially excludes PHYs beyond the project's scope.

Cl **30** *SC* **30.3** *P* **37** *L* **31** # i-215

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA*

I believe that the BEHAVIOUR of each of the following MAC attributes may need additional text to describe how it behaves (differently) when used in a PLCA network: 30.3.1.1.3 aSingleCollisionFrames; 30.3.1.1.4 aMultipleCollisionFrames; 30.3.1.1.9 aFramesWithDeferredXmissions; 30.3.1.1.10 aLateCollisions; 30.3.1.1.20 aFramesWithExcessiveDeferral; 30.3.1.1.30 aCollisionFrames; 30.3.1.1.31 aMACCapabilities; 30.3.1.1.32 aDuplexStatus

SuggestedRemedy

Examine each BEHAVIOUR for each of the listed attributes in the context of PLCA operation and augment the text definition of each BEHAVIOUR to cover operation in PLCA mode. This should explicitly cover whether an occurrence is an error in PLCA operation when such is not the case in CSMA/CD.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. PLCA does not to change the behavior of these attributes.

Cl **147** *SC* **147.5.6** *P* **197** *L* **18** # i-256

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PMA Electrical*

I don't understand how the following text can be true: "The PMA local loopback function is optional" ...on a PMA where transmit is connected to receive.

SuggestedRemedy

Please clarify. I think you mean "The PMA local loopback test function is optional."

Response *Response Status* **U**

REJECT.
The CRG disagrees with the comment.
The PMA local loopback function is optional.
What this test mode does in
- half-duplex mode, is overriding part of the condition on the single-ended arrow that point into WAIT_SYNC in "Figure 147-7-PCS Receive state diagram", allowing receiving back transmitting station's own data.
- full-duplex mode, is suspending functionality that would prevent the transmitting station from receiving its own data.

Cl **148** *SC* **148.1** *P* **214** *L* **12** # i-265

Thompson, Geoffrey Independent Consultant

Comment Type **ER** *Comment Status* **A** *PLCA_SCOPE*

The first sentence refers to PLCA as though it is already a familiar, well understood and well specified protocol that is familiar to the reader by the time he gets to clause 148 of IEEE Std. 802.3. Such is hardly the case.

SuggestedRemedy

Add the following text to the last paragraph: "PLCA modifies the CSMA/CD shared media access method so that assured access is provided via the collision free round robin protocol specified in this clause." This is a necessary but not sufficient addition. We'll leave further detail requirements to later in the clause..

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Change "This clause specifies the optional Physical Layer Collision Avoidance (PLCA) capabilities. PLCA is defined for half-duplex mode of operation only. The PLCA RS is specified for operation with the PHY defined in Clause 147 (10BASE-T1S). PLCA is designed to work in conjunction with CSMA/CD and can be dynamically enabled or disabled via management interface."

to

"This clause specifies a reconciliation sublayer to provide optional Physical Layer Collision Avoidance (PLCA) capabilities among participating stations. The PLCA RS is specified for operation with Clause 147 (10BASE-T1S) PHYs operating in half-duplex multidrop mode. PLCA can be dynamically enabled or disabled via management interface.

When enabled, the PLCA RS aligns data from the MAC with transmission opportunities of the physical layer and maps the physical layer signals to PLS primitives towards the MAC. The use of PLCA-enabled physical layers in CSMA/CD half-duplex shared-medium networks provides enhanced performance relative to CSMA/CD without PLCA. PLCA-enabled nodes can coexist with nodes without PLCA enabled on the same mixing segment, all using 802.3 CSMA/CD."

Change "This clause specifies the optional Physical Layer Collision Avoidance (PLCA) capabilities. PLCA is defined for half-duplex mode of operation only. The PLCA RS is specified for operation with the PHY defined in Clause 147 (10BASE-T1S). PLCA is designed to work in conjunction with CSMA/CD and can be dynamically enabled or disabled via management interface."

to

"This clause specifies a reconciliation sublayer to provide optional Physical Layer Collision Avoidance (PLCA) capabilities among participating stations. The PLCA RS is specified for operation with Clause 147 (10BASE-T1S) PHYs operating in half-duplex multidrop mode.

PLCA can be dynamically enabled or disabled via management interface.

When enabled, the PLCA RS aligns data from the MAC with <scheduled> transmission opportunities of the physical layer <in a round robin fashion for PLCA participants> and maps the physical layer signals to PLS primitives towards the MAC. The use of PLCA-enabled physical layers in CSMA/CD half-duplex shared-medium networks provides enhanced performance relative to CSMA/CD without PLCA< by avoiding corruption of signals on the media itself>. PLCA-enabled nodes can coexist with nodes without PLCA enabled on the same mixing segment, all using 802.3 CSMA/CD."

Straw Poll #3: (pick one)
A: I am happy with an ACCEPT IN PRINCIPLE with the text above in angle brackets
B: I am happy with an ACCEPT IN PRINICPLE with the text above without the text in angle brackets
C: I am unhappy with either A or B.

A: 1 B: 9 C: 2

Motion #9: Accept the text above as the response to comment i-265 without the text in angle brackets, as described by straw poll #3 choice B.
M: Peter Jones S: Phil Brownlee
Y: 21 N: 2 A:5 Motion Passes (technical >= 75%)

Cl **148** *SC* **148.2** *P* **214** *L* **42** # i-268

Thompson, Geoffrey Independent Consultant

Comment Type **TR** *Comment Status* **R** *PLCA_ID*

This lack of a complete specification for full functionality is completely unprecedented for 10 Mb/s Ethernet and a major shortcoming. Plug and work, historically, has been a major factor in the success of Ethernet in face of the competition (which usually required a bunch of configuration before it would go on-line). Two examples of this in the history of Ethernet come to mind: (1) In the early days of 10 Mb/s full duplex and 100BASE-T early implementations of AutoNegotiation did not work very well. The failure of the promised plug 'n' play was a major marketing issue. (2) In the very first (3 Mb/s) version of Ethernet, DTEs only had 8 bit addresses. They had to have their addresses manually configured with push-on test leads as part of their installation process. This made the customer (most of whom were EEs or Computer Scientists) installation not possible and a technician had to be involved. Major network management problem.

SuggestedRemedy

Come up with and require availability of an automatic configuration app. No reason one shouldn't be able to use the CSMA/CD capability to (1) identify the stations on the local segment and (2) hand out the unique assigned node ID to each DTE.

Response *Response Status* **U**

REJECT.
CRG disagrees with the commenter:

The CRG specifically disagrees on these points:
[1] PLCA is an optional feature that still operates under misconfiguration. See http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf
[2] The draft does not constrain how the value for PLCA node ID is obtained. There are many different ways to implement this.
[3] Defining an "automatic configuration app" may be a desirable feature, but is only one of a large set of possible solutions.
[4] Default operation is with PLCA turned off, allowing interoperable plug-and-play, and opportunity for the management entity to configure for improved performance.

Cl **148** *SC* **148.3** *P* **215** *L* **5** # i-270

Thompson, Geoffrey Independent Consultant

Comment Type **ER** *Comment Status* **R** *PLCA_SCOPE*

The "Relationship with other IEEE standards" is incorrect with respect to the ISO Layer Model, 802 tradition and precedent and previous 802.3 projects that fiddled with shared media access methods[1]. When 802 did its adaptation of the ISO 7 Layer Model it subdivided the Data Link Layer into the LLC Sublayer and the MAC Sublayer specifically so that there was a separate place in the overall 802 model that "performs access control functions for the shared medium in support of the (common) LLC Sublayer[2]". Properly placed, PLCA would conform to this model, or (more properly) PLCA and CSMA/CD together would supply a complete MAC Sublayer for PLCA operation that would have a "Distinct Identity" that is different from CSMA/CD - Ethernet. To make things fit into the desired product implementation for fitting to existing IP the new PLCA block could have both a top MII to interface to existing designs and a bottom MII to attach to the PHY in the conventional manner. [1] Clause 64, Clause 99 [2] IEEE Std 802-1990 Overview & Architecture

SuggestedRemedy

Remove the entire PLCA clause (148) and associated textual material plus references from the draft. This will eliminate any scope issues and bring the draft into fully into line with the letter and expectations of the project paperwork at all levels (i.e. PAR, CSD, 802.3 project Objectives) [Further, thoughts not needed to resolve my required comment. I would fully support the creation of a new project to take place either within 802.3 or in a new 802 Working Group to standardize what we now call PLCA as a MAC sublayer element where the other required elements for a full DTE standard are provided by reference to the relevant portions of the 802.3 standard, as appropriate.]

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter's description of layering and the proper placement of PLCA in the layering model. PLCA performs the functions delegated by the 802.3 layer model to the physical layer - carrier sense and collision detection. Commenter seems to posit an implementation which is not described in the amendment, where the PLCA sublayer interfaces to the MAC via an MII. (a "top MII" per the commenter), whereas PLCA maintains the layering and communicates to the MAC via the primitives PLS_CARRIER and PLS_SIGNAL defined in IEEE Std 802.3, and communicates with the remainder of the physical layer through the MII interface. For more detail on how PLCA relates to OSI layering please see
http://www.ieee802.org/3/cg/public/adhoc/brandt_020619_3cg_01a_adhoc.pdf.

Additionally, the fact that PLCA-enabled half-duplex CSMA/CD stations may operate with and coexist with non-PLCA enabled half-duplex CSMA/CD stations on the same mixing segment is evidence that the PLCA RS is located beneath the CSMA/CD MAC and not a new MAC function in itself. See
http://www.ieee802.org/3/cg/public/Jan2019/Tutorial_cg_0119_final.pdf and
http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf

Motion #10:
Resolve comment i-270 with the proposed reject response above:
M: Peter Jones
S: Tim Baggett
Y: 20 N: 0 A: 10 (motion passes)

Cl **148** *SC* **148** *P* **214** *L* **1** # i-390

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA_SCOPE*

[PAR] PLCA Reconsciliation Sublayer (RS) contain specifications that handles contention avoidance and collision handling as well as access control. Media Access Control (MAC) specification is not a part of this Physical Layer project, as stated in this PAR scope:
"5.2.b. Changes in scope of the project: Specify additions to and appropriate modifications of IEEE Std 802.3 to add 10 Mb/s Physical Layer (PHY) specifications and management parameters for operation, and associated optional provision of power, using a single balanced pair of conductors.", whereas the MAC definition is in CL 4.1.1 of IEEE 802.3-2018 states:
"...The MAC sublayer defines a medium-independent facility...b) Media Access Management
1) Medium allocation (collision avoidance)
2) Contention resolution (collision handling).."

Furthermore, Reconsilliation Sublayer, as defined in the same parent document IEEE 802.3-2018, in 1.4.425 states "1.4.425 Reconciliation Sublayer (RS): A mapping function that reconciles the signals at the Media Independent Interface (MII) to the Media Access Control (MAC)-Physical Signaling Sublayer (PLS) service definitions. (See IEEE Std802.3, Clause 22.)". PLCA RS claims to be an RS, but does NOT simply map PLS to MII, but performs 1) Medium allocation (collision avoidance) -- as the title says ("physical layer Collision Avoidance), 2) Contention resolution (collision handling). PLCA performs Medium Access control function (MAC).

SuggestedRemedy

Align this draft to the approved PAR (14-May-2018)by deleting CL148 in its entirety (pages 214 through 234, inclusive) and any changes associated with such deletion. Alternatively, submit a new PAR that substantialy reflect this project content, including a MAC specification in the scope, and provide approved PAR with such revised scope. If a new PAR is submitted with MAC specification in scope, then re-open and seek technical contributions with regards to the new scope.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
Specifically the CRG disagrees that the Clause 148 PLCA RS is a new MAC. It does not meet the requirements for a MAC, and leaves the MAC functionality with Clause 4. In fact, the network could not work without the MAC functionality.

Additionally, the Task Force has previously considered the issues raised by the commenter and has also reviewed and evaluated contributions that rebut the commenter's assertions.

The CRG believes the PLCA RS only performs functions delegated to the physical layer, which the MAC uses to perform its functions. For example, see www.ieee802.org/3/cg/public/Jan2019/Tutorial_cg_0119_final.pdf
for further information.

See also http://www.ieee802.org/3/cg/public/adhoc/brandt_020619_3cg_01a_adhoc.pdf
for a discussion of layering as it relates to this draft.

Cl **147** *SC* **147.1** *P* **167** *L* **12** # i-391

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Modes*

[CSD] CSD/Broad Market Potential is no longer assured in this project when the half-duplex point to point link segment PHY operation, traditionally associated with broad market with use of star-wired multi-port repeaters (e.g. 10BASE-T hubs/repeaters) is not supported.

An explicit statement of mandatory operation of this PHY:
"The 10BASE-T1S PHY is specified to be capable of operating at 10 Mb/s in several modes. All 10BASE-T1S PHYs can operate as a half-duplex PHY with a single link partner over a point-to-point link segment defined in 147.7..."

An explicit statement of non-support of repeaters:
Pg 30, CL9.1 proposed change states "This clause specifies a repeater for use with IEEE 802.3 10 Mb/s baseband networks, with the exceptions of
10BASE-T1L (Clause 146) and 10BASE-T1S (Clause 147)...."

Repeating the concern -- only PHY operation that is mandatory is point-to-point link without any allowance for repeaters (i.e. exactly two node network) operating in half-duplex, contention resolution network does NOT have broad market potential.

SuggestedRemedy

Delete market-potential irrelevant PHY that supports exactly two node network over a point-to-point link, and make one of the more market-potential-relevant PHYs from
"...additionally, there are two mutually exclusive optional operating modes: a
full-duplex point-to-point mode over the link segment defined in 147.7, and a half-duplex shared-medium
mode, referred to as multidrop mode,..."
and update the CSD/Broad Market Potential as appropriate.

Response *Response Status* **U**

REJECT.

CRG disagrees with the commenter. The clause contains one PHY with three modes, with a common-denominator for interoperability. CRG disagrees with the commenter on the relevance of the mandatory mode of operation (half-duplex point-to-point). There are multiple methods of inter-linking point-to-point half-duplex segments, without the use of clause 9 repeaters using multiple topologies of choice, allowing larger networks (with more than 2 stations). A bridge is considered to be an element in common networks. Bridges have functionally replaced repeaters in most networks.

Cl **147** *SC* **147.1** *P* **167** *L* **13** # i-392

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Modes*

[CSD] CL147 title states a single PCS/PMA type 10BASE-T1S. But in reality, it has three PHYs. Two of the three PHYs not compatible and do not interoperate. This issue is explicitly stated with "mutually exclusive" operation, which equals not-compatible and not interoperate.

"All 10BASE-T1S PHYs can operate as a half-duplex PHY with a single link partner over a point-to-point link segment defined in 147.7, and, additionally, there are two mutually exclusive optional operating modes: a full-duplex point-to-point mode over the link segment defined in 147.7, and a half-duplex shared-medium mode, referred to as multidrop mode, capable of operating with multiple stations connected to a mixing segment, defined in 147.8."

Full-duplex P2P PHY implements echo cancelation. Half-duplex shared meidum does not. They do not interoperate with each other. These may share the similar or substantially same PCS, these do not share PMAs. They do not interoperate; PMAs are substantially different; they are differnet PHYs. These two PHYs should be, at least, designated as different type.

If the argument is made that these two PHYs must support P2P half-duplex (therefore interoperate), and in such case, they interoperate, then we should also be reminded that P2P half-duplex (with no provision for repeaters) allow for exactly two node network collision based network. Exactly two node, and only two node, connectivity does not network make.

SuggestedRemedy

Either structure CL147 to specify two different PHY types, P2P full-duplex PHY, and 'multi-drop' half-duplex PHY. They do not interoperate with each other, therefore they are not the same type of PHY.
Or split CL147 into a CL on common PCS, and two more CLs, one for each of the two separate PMA for respective PHYs.

With regards to the P2P half-duplex PHY, please delete it from this draft. The value and use of exactly two (and only two) node network is very limited to say the least.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The clause contains one PHY with a common-denominator for interoperability. CRG disagrees with the commenter that the modes do not interoperate.

The commenter seems to make multiple incorrect interpretations of the text. Mutual exclusivity is with regards to the fact that a single PHY cannot operate in half-duplex and full-duplex at the same time. The PHY contains a single PCS, and a single PMA is specified along with options.

Regarding the half-duplex point-to-point functionality, there are multiple methods of inter-linking point-to-point half-duplex segments, without the use of clause 9 repeaters using multiple topologies of choice, allowing larger networks (with more than 2 stations). A bridge is considered to be an element in common networks. Bridges have functionally replaced repeaters in most networks.

Cl **148** *SC* **148** *P* **214** *L* **1** # i-393

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA_SCOPE*

[CSD] CSD/Economic Feasibility statements in CSD document is not valid for CL148 PLCA operation.
The project CSD states that "
The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
-The reduction in the number of legacy networks requiring specialized components, expertise, and gateways in the targeted markets is anticipated to result in a significant drop in both installation and operational costs."
While the cost factors for Ethernet is well known, this project introduces the new requirements that has not been a part of Ethernet. This project requires each node to be assigned a unique and sequential (as in little to no gaps in number sequence) node identifier to be assigned to each PHY, and allocate and assigna a special node identifier value of zero to a 'master node' that is responsible for sending special 'beacon' frame.
This project requires that the configuration is assured (outside of this draft standard) that node identifier of zero is present, and only one of such node identifier is present. This operation described in this project cannot reasonably assume that this new behavior requirement could inherit "well known Ethernet cost factors". Also this project cannot reasonably assert assert "drop in both installation and operational costs" when addtional configuration of node assignment and behaviors are required and without any specification on how they are done.
CSD/Economic Feasibility with regard to other clauses, other than CL148, are not in question.

SuggestedRemedy

CSD/Economic Feasibility with regard to CL148 PLCA operation is no longer valid and grossly incorrect. Appropriate changes to the CSD/Economic Feasibility to be made and to be approved.

Response *Response Status* **U**

REJECT.
CRG disagrees with the commenter.

Both the 802.3 working group and the 802 Executive Committee have confirmed the CSD responses.
Any changes to the CSD documents, as the commenter requests, would be handled through internal 802 processes which are outside the SA ballot process.

With respect to the issues raised by the commenter regarding node ID assignment, the CRG specifically disagrees on these points:

[1] PLCA is an optional feature that still operates under misconfiguration. See http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf
[2] The draft does not constrain how the value for PLCA node ID is obtained. There are many different ways to implement this.
[3] Default operation is with PLCA turned off, allowing interoperable plug-and-play, and opportunity for the management entity to configure for improved performance.

The CRG additionally disagrees on these points the commenter asserts:
[1] PLCA node IDs do not need to be sequential
[2] There is no such description of master node in the draft
[3] The BEACON is not a frame, it is a 20 bit long signal on the line which carries no information apart from its own presence. It is conceptually not different from IDLE signals which most physical layers use to retrieve clocking information.

Cl **22** *SC* **22** *P* **31** *L* **13** # i-394

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *MII*

[CSD] CSD/Compatibility states "As a PHY amendment to IEEE Std802.3, the proposed project will use MII, and follow the existing format and structure of IEEE 802.3 protocol-independent specification of managed objects." It does NOT state that it will change MII and then use the modified version of MII. It states that this project will use MII. This project violates the stated compatibility statement. In addition, MII is widely used and deployed exposed interoperability interface, still with large installed based that is difficult to determine (installation spread over 10~15 years, starting 20+ years ago). One of the test whether an interface has been materially changed is by looking at the PICS in CL22.8.3 and there are 5 enteries that changes the requirments to the installed base of MII.

SuggestedRemedy

Reverse all material changes to CL22 and make appropriate changes in other clauses of this project to make it work with CL22. If this cannot be done, then appropriate changes to the CSD/Compatibility with regard to CL22 be made and to be approved.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. Functionality is specified using reserved codes at the MII to prevent any compatibility issue with compliant PHYs.

Cl **22** *SC* **22.2.2.5** *P* **31** *L* **49** # i-395

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *MII*

In "..with the exception of 10BASE-T1L (see 146.3.3.1) and 10BASET1S(see 147.3.2.1, Figure 147-4).", 10BASE-T1L is unnecesarily included as if 10BASE-T1L requires this change. It doesn't. TXER was added during 100 Mbps Ethernet projects, and some 10 Mbps system implementations being upgraded to 100 Mbps would experience buffer underruns, and wanted to have an option to signal to the PHY to corrupt the FCS. 10 Mb/s system never had such considerations nor signal that corresponds to TXER. If TXER is asserted, then 10BASE-T1L merely maps to an error symbol.

There is no need to change CL22 from 10BASE-T1L, and having it included in this proposed revision to CL22 distracts from the fact that CL22 modification is entirely caused by CL148 PLCA RS.

SuggestedRemedy

Remove the text "10BASE-T1L (see 146.3.3.1) and ", and make appropriate changes to the 10BASE-T1L (CL146) to remove superfluous support of TXER.

(Note: the subjective "superflueous" is used becase in modern (higher performance) systems as well as back in 10 Mbps systems, the need for FIFO underrun implementational error handling are not needed).

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. An exception has been added to clarify that the use of TX_ER with 10BASE-T1L/S PHYs is not precluded and, in fact, references to the behavior of these new PHYs with TX_ER are provided.

Cl **148** *SC* **148.2** *P* **214** *L* **44** # i-396

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA_ID*

[CSD] PLCA RS requires 1) each node/PHY to be configured with a nodeID, 2) entire network node/PHY configuration to be coordinated, i.e. unique and nearly sequential nodeID values, unique node with nodeID=0, etc 3) provides no protocol with which #2 could be accomplished, i.e. no interoperable protocol to achieve these requyirements, 4) provides no remedy for boundry conditions such as multiple nodeID=0, no node with nodeID=0, non-unique nodeID in a network, unconfigured node in a configured network, etc, 5) provides no protocol that may discover any of these issues.

CSD/Compatibility means that two or more complaint implementations would interoperate with a high degree of probablity. This is one of the main reasons most standards to exist -- assured and certain interoperability.

PLCA RS in CL148 does not meet this CSD requirements, nor its asserted claim in its CSD response.

SuggestedRemedy

CSD/Compatibilty assertions with regard to CL148 PLCA operation is grossly incorrect. Appropriate changes to the CSD/Compatibility with regards to PLCA's inability to assure two compliant implementations interoperate without further engineering, design, and configuration be addressed, OR add appropriate specifcations to remedy the concerns WRT interoperability and completeness of specification that assure interoperability, OR delete CL148 PLCA from this draft (and re-start the project development with completeness as a required scope, if desired.)

Response *Response Status* **U**

REJECT.
CRG disagrees with the commenter:

The CRG specifically disagrees on these points:
[1] PLCA node IDs do not need to be sequential
[2] PLCA is an optional feature that still operates under misconfiguration. See http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf
[3] The draft does not constrain how the value for PLCA node ID is obtained. There are many different ways to implement this.
[4] Default operation is with PLCA turned off, allowing interoperable plug-and-play, and opportunity for the management entity to configure for improved performance.

Cl **148** *SC* **148.2** *P* **214** *L* **44** # i-397

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA_ID*

[CSD/Compatibility + PAR] CL148 PLCA RS does not specify how a node is selected for NodeID=0, how other NodeIDs are assigned, how an end-station is aware of other end-stations configuration enough to configure itself to operate, etc, such that two implementations connected via a referenced network segment is not assured to work. This indicates grossly incomplete specification.

SuggestedRemedy

Complete CL148 specification by including additional currently-missing specifications on how all parameters necessary to assure interoperability is achieved via non-vendor-denpendant protocols. Since this is a concern WRT to missing specification, the suggested remedy is not included (i.e. filling in the missing specification is the scope of the IEEE 802.3cg project).

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
Description or requirements of assignment of parameters in the management entity is beyond the scope of this standard.

This is clearly stated in 148.2 (draft 3.0 is quoted): "Other than the condition that the assigned node ID must be unique to the local collision domain, the method of determination of the node ID and to_timer by the management entity is beyond the scope of this standard."

Additionally, end stations on mis-configured networks or networks where not all the nodes are configured for PLCA operation will, in fact, operate, allowing configuration to be set by management for improved performance. See http://www.ieee802.org/3/cg/public/Sept2018/beruto_3cg_mixing_PLCA_with_non_PLCA_enabled_nodes_r1.2.pdf

Cl **30** *SC* **30.3.9.2.7** *P* **39** *L* **47** # i-399

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA*

aPLCABurstTimer measure bit times inside the internal process where the entire packet is transferred atomically. This is entirely (externally) invisible parameter, meaning any number of bit-times an implementation uses, it is indinguishable from other MAC transmit schedulling; therefore meaningless. IPG is generated by PLS/RS. The default value of 128 *may be* relevant if this timer is measuring the gap at the PCS. But at RS, this timer is meaningless.

SuggestedRemedy

Delete this timer.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The RS interfaces to the MAC layer via the PLS primitives and to the PHY via the MII interface. The RS groups and aligns the bits conveyed by the MAC via the PLS_DATA.request primitive to the MII TX_CLK (See 22.2.1.1 and 22.2.1.1.3). This mapping clarifies the specification of bit times within an RS. (see also 148.4.3.1)

Cl **30** *SC* **30.3.9.2.6** *P* **39** *L* **36** # i-400

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA*

Capability for aPLCAMaxBurstCount set to 255 packet bursts would significantly impact fairness ("multiple-access") and would cause upper layer protocol time-outs.

SuggestedRemedy

Reduce the burst down to maximum size frame worth of packet packing (which I believe is not possible in current MAC services model), or some reasonable length such as 2 x max size frame (which I believe is achievable), or demonstrate the max range still provides fairness and provide confidence that properly (in-range value) configured nodes in a given network would not cause upper layer protcol time-outs.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The comment regarding upper layer protocols is protocol specific, which is outside the scope of IEEE 802.3.

The commenter did not provide a proposed resolution in sufficient detail to readily determine the specific wording of changes that will cause him to change his vote to approve (see SASB Ops Manual clause 5.4.3.2,b).

Cl **30** *SC* **30.3.9.2.5** *P* **39** *L* **24** # i-401

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **A** *PLCA*

aPLCATransmitOpportunityTimer seem to be a tuning parameter that is related with both PHY delay and given propogation delay (network diagmeter). And the PHY delays of *all* the nodes in the system. The default value of 20 bit times does not match 8 node 15 meter network worst case pararmeter.

SuggestedRemedy

Provide the default value that represent the worst case delays and supported network diameter such that a network using all defaults (plug and play and no configuration) is assured to work. If

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

Accommodated by comment i-191.

Response to Comment i-191 is:
ACCEPT.
Suggested remedy is:

Replace, "The default value is 20."

with, "The default value is 24." on page 39, line 34.

Cl **147** *SC* **147.8.1** *P* **199** *L* **52** # i-402

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Mixing Segment*

The mixing segment shall meet the insertion loss characteristics specified for link segments in 147.7.1
between any two MDI attachment points. And from 147.8 "A mixing segment is specified based on cabling that supports up to at least 8 nodes and 25 m in reach". From both of this statement, this specification is requiring 28 (combination of any two) measurement taken. And any added nodes requires all combinations to be measured again, and with no assurances that the prior conformant MDI may fall out of range.

SuggestedRemedy

Provide better medium specifcation and cable design considerations that can be followed assured scaleable MDI and medium construction.

Response *Response Status* **U**

REJECT.
The proposed change in the comment does not contain sufficient detail so that the CRG can understand the specific changes that satisfy the commenter.

Further, the CRG disagrees with the commenter, as the commenter mistakes 147.8 explanatory text with the specification ("is specified" vs. "shall meet.").

There are alternative ways to taking a large number of measurements to validate a mixing segment compliant with the specifications in 147.8. For example, simulation with sample validation is a common approach. It is also common practice for cabling systems to be specified to be compliant by design rather than necessarily measured for each instance. Further, the characteristics required have been specified based on measurements indicating that they support the described topologies, an existence proof that design is feasible.

Cl **147** *SC* **147.8.2** *P* **200** *L* **52** # i-403

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Mixing Segment*

The mixing segment shall meet the return loss characteristics specified for link segments in 147.7.2
between any two MDI attachment points. And from 147.8 "A mixing segment is specified based on cabling that supports up to at least 8 nodes and 25 m in reach". From both of this statement, this specification is requiring 28 (combination of any two) measurement taken. And any added nodes requires all combinations to be measured again, and with no assurances that the prior conformant MDI may fall out of range.

SuggestedRemedy

Provide better medium specifcation and cable design considerations that can be followed assured scaleable MDI and medium construction.

Response *Response Status* **U**

REJECT.
The proposed change in the comment does not contain sufficient detail so that the CRG can understand the specific changes that satisfy the commenter.

Further, the CRG disagrees with the commenter, as the commenter mistakes 147.8 explanatory text with the specification ("is specified" vs. "shall meet.").

There are alternative ways to taking a large number of measurements to validate a mixing segment compliant with the specifications in 147.8. For example, simulation with sample validation is a common approach. It is also common practice for cabling systems to be specified to be compliant by design rather than necessarily measured for each instance. Further, the characteristics required have been specified based on measurements indicating that they support the described topologies, an existence proof that design is feasible.

Cl **45** *SC* **45.2.1.186e.1** *P* **51** *L* **16** # i-404

Kim, Yongbum NIO

Comment Type **ER** *Comment Status* **R** *Multidrop*

The word "multi-drop" is a new term that does not convey any different meaning than "[half-duplex] [shared] mixing segment" as opposed to "[point to point] link segment". There is no reason to introduce a new term that does not convey anything new.

SuggestedRemedy

Delete the use of "multi-drop" here and the rest of the draft, and use existing "half-duplex", "shared medium", "mixing segment", etc, as appropriate. OR, clearly define what is different about the use of "multi-drop".

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. Multidrop is only used in the draft for the name of the shared-medium mode of Clause 147 PHYs as "multidrop mode" (the term "multi-drop" is not used), and is defined at the start of clause 147 (page 167, line 15 "a half-duplex shared-medium mode, referred to as multidrop mode, capable of operating with multiple stations connected to a mixing segment, defined in 147.8."). No further description is needed, and it is not synonymous with any of the terms suggested by the commenter.

Cl **45** *SC* **45.2.3.68b.5** *P* **54** *L* **40** # i-405

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Registers*

"Fault -- Fault condition
detected.. " is just too vague. Does reader assume the "fault" relates to PCS fault? And is it any detectable fault? Any implementation specific faults? So if I read this latched bit as one, what information do I get -- there was a fault and we don't know what caused it.
So what value is there? Makes little sense. I cannot even suggest wording that may be satisfactory.

SuggestedRemedy

Assuming this is PCS fault TX or RX.. Reference detected fault types in relevant PCS clauses. If this is just thrown in for any fault and .3cg want it, then say "ANY DETECTED PCS FAULT". If there is no agreement how this is used, then I suggest deleting it.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. Text is consistent with specification for PMA and PCS faults in IEEE Std 802.3.

See, e.g., 45.2.1.2.3 Fault (1.1.7) for PMA/PMD faults, or 45.2.3.2.5 Fault (3.1.7), for the corresponding PCS fault.

Cl **45** *SC* **45.2.3.68d.1** *P* **57** *L* **32** # i-406

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA*

The concern is where entire function of PLCA resides. Is it just in RS (CL148)? Or is there PLCA mandatory components in PCS and/or PMA? This specification indicates that [optional] PLCA RS resides in PCA and PMA, requiring features otherwise not required for non-PLCA implementations.

10BASE-T1S PCS contains PLCA components that are optional. This is entirely inconsistent with PLCA is a optional function in RS layer. It looks to be that PLCA is also an optional function in PCS layer. If this is the case, the standard should state this. And if the PLCA is also an optional function in PMA layer, it
should also be stated as such.

SuggestedRemedy

Either delete this PLCA Support in PCS/PMA and other PCS/PMA clauses, or clarify which layer(s), the optional PLCA function resides\, besides stated CL148 RS.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The referenced text is purely a detection that the transmitted signal is not corrupted and is entirely in Clause 147 PCS/PMA and does not represent PLCA function. It is not strictly PLCA support, and is not PLCA function. It may be useful for a variety of debugging purposes, including, but not limited to, when the clause 148 PLCA is used.

Cl **45** *SC* **45.2.3.68f** *P* **58** *L* **24** # i-407

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **A** *PLCA*

CorruptedTxCnt is defined as "16 bits field counting each time a transmission initiated locally results in a corrupted signal at
the MDI since last read of this register". This counter has several issues. It is not clear whether this counter is to count 1) every bit error (bit-by-bit comparison), 2) every error event (burst error event), or 3) every packet error event. Also "transmission initiated locally" is not clear. Assuming this means local node transmitting, does it apply to packets, BEACON and other signals? And is it bit-by-bit, or burst or symbol or packet or other error events?

SuggestedRemedy

Please clarify what "corruption" event this counter is counting, and reference where in the CL147 specification the event-to-be-counted resides (to assure proper formal reference to the event(s)).

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

Replace, "Bits 3.2294.15:0 count up each time a transmission initiated locally results in a corrupted signal at the MDI."

with,
"Bits 3.2294.15:0 count up at each positive edge of the MII signal COL."

Cl **45** *SC* **45.2.3.68f** *P* **58** *L* **19** # i-408

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *MDI*

"...MDI". There is no definition of MDI in CL147 that this refers to. Medium Dependant Interface, MDI, is an accepted interoperability interface. Optional-use connectors in CL147 are not MDI, unless it states the normative nature of the connector.

SuggestedRemedy

Either provide alternate referece to the medium connection point, or define nomative MDI in CL147.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The MDI is a defined interface point in Clause 147. See figure 147-1. A connector at the MDI may or may not be defined (and this varies in other IEEE Std 802.3 clauses), but the MDI remains at the plane of connection between the DTE and the specified link or mixing segment. See Figure 147-1. Additionally, electrical and tolerance characteristics of the MDI are specified in 147.9.2, 147.9.3, and 147.9.4.

Cl **146** *SC* **146.4.3** *P* **133** *L* **35** # i-409

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PMA*

"The sequence of symbols assigned to tx_symb_vector is needed to perform echo cancellation." is not sufficient. It should also include reference to the MASTER and SLAVE PMA clock recovery function.

SuggestedRemedy

Change the text to read
"In addition to the PMA Clock Recovery function (see 146.4.6), the sequence of symbols assigned to tx_symb_vector is needed to perform echo cancellation."

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
The commenter asks for a tutorial and the standard is not a tutorial - no change required.

The only information which is inherently needed is the transmitted symbol stream. The echo can be removed an any implementation-dependent manner. The standard is not intended to be a tutorial on signal processing or constrain possible solutions. For example, a receiver could estimate the timing separately from the data, or cancel in the continuous time domain, neither of which requires the clock.

Cl **146** *SC* **146.8** *P* **153** *L* **1** # i-410

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Big Ticket Item MDI*

The connectors described MAYBE used at the interface to the medium. This is an allowance. MDI is a normative conformance test point. The title of this subclause say "148.8 MDI specifications". It's not.

SuggestedRemedy

Change the title to "MDI Considerations" or "Medium Interface Connectors" or something else that avoids wrong inference that any of these connectors are normative interoperability test points.

Response *Response Status* **U**

REJECT.

The CRG disagrees with the commenter. The commenter appears to be confusing the MDI and the MDI connector.

The subclause, in its subordinate subclauses, spells out specifications for the MDI.

The second sentence of 146.8 states this - "It also specifies electrical requirements, including fault tolerance, at the MDI."

While connectors that may be used (and references to their specifications) are called out in 146.8.1, electrical, power, and fault tolerance specifications for the MDI are provided in subordinate subclauses 146.8.2, 146.8.3, 146.8.4, and 146.8.5.

Cl **147** *SC* **147.1** *P* **167** *L* **12** # i-411

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *Modes*

Chater and scope of this PHY clause and CSD concern.

This clause has three separate PHYs that should not be considered as one PHY with two options.

1. Full-Duplex P2P PHY: Performs echo cancellation, full-duplex over one transmission line. This is an optional PHY in CL147.

2. Half-Duplex P2P PHY: Traditiionally used with multi-port CL9 repeaters, this allows exactly two node network (one link, two link partners) and only such network, because the Clause 9 repeater is not supported as per proposed text in CL9. This is not a network. Two and only two node connection is a dedicated link. This is only mandatory PHY operation in CL147.

3. Half-Duplex Shared Medium PHY: Does NOT perform echo cancellation, half-duplex over shared medium. This is an optional PHY in CL147.

And the text says #1 and #3 are NOT interoperable -- CL147.1 says "..there are two mutually exclusive optional operating modes...".

The only mandatory PHY (Half-Duplex P2P) is useless. Two other PHYs are optional, but they are not optional to each other (mutually exclusive), yet all three PHYs are referred to as type 10BASE-T1S.

This clause organization is grossly in error. Each distinct PHY should has its own type designation (possibly its own clause, but only for clarity), #2 Half-duplex P2P PHY should be deleted for the stated reason of not being useful as a 'network'.

SuggestedRemedy

Pick the one PHY that meets CSD and objectives as written, or split this clause into at least two (one for P2P and one for Shared medium) separate PHY clauses and re-state the respective CSD as appropirate.

Response *Response Status* **U**

REJECT.

CRG disagrees with the commenter. The clause contains one PHY with three modes, with a common-denominator for interoperability. CRG disagrees with the commenter on interest in the mandatory mode of operation (half-duplex point-to-point). There are multiple methods of inter-linking point-to-point half-duplex segments, without the use of clause 9 repeaters using multiple topologies of choice, allowing larger networks (with more than 2 stations). A bridge is considered to be an element in common networks.

Cl **147** *SC* **147.3.7.1** *P* **185** *L* **19** # i-412

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PCS*

WRT to "When the PHY is not in multidrop mode and a BEACON is received either over the MII or from the line, the state diagram in Figure 147-10 enters the DISABLE_HB state and stays there until PCS Reset is asserted,...". This statement makes support of PLCA RS in 10BASE-T1S PHY (current all three of 10BASE-T1S PHYs) not optional. PLCA RS is advertised as optional RS. The recognition of BEACON (in proposed changes to CL22) requires support of the optional RS, but this clause does not specify the optional RS bevior. This and two other shalls in this subclause makes it mandatoy implementation in all 10BASE-T1S PHYs.

SuggestedRemedy

Delete CL147.3.7.1 requirements.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
The decoding and signaling of the COMMIT and BEACON indications, and presentation of the signaling onto the MII does not make support of PLCA mandatory.
When the PLCA is not enabled or not supported, RS operation shall conform to C22, which would cause the signals to be ignored because the state diagrams they effect are not implemented, and the codes are defined as reserved with no action in existing clause 22, per IEEE Std 802.3-2018, 22.2.2.8:
"While RX_DV is deasserted, RXD<3:0> shall have no effect on the Reconciliation sublayer."

See also 215/51 ("148.4.2 Reconciliation Sublayer operation").

Cl **147** *SC* **147.3.3.10** *P* **185** *L* **10** # i-414

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PCS*

Generation of Commit indication states PHY shall notify RS of received Commit by the means of MII interface in 22.2.2.8. This statement makes support of PLCA RS in 10BASE-T1S PHY not optional. PLCA RS is advertised as optional RS. The use of COMMIT (in proposed changes to CL22) requires support of the optional RS, but this clause does not specify the optional RS bevior. This and two other shalls in this subclause makes it mandatoy implementation in all 10BASE-T1S PHYs.

SuggestedRemedy

Delete CL147.3.3.10 requirements.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
The decoding and signaling of the COMMIT and BEACON indications, and presentation of the signaling onto the MII does not make support of PLCA mandatory.
When the PLCA is not enabled or not supported, RS operation shall conform to C22, which would cause the signals to be ignored because the state diagrams they effect are not implemented, and the codes are defined as reserved with no action in existing clause 22, per IEEE Std 802.3-2018, 22.2.2.8:
"While RX_DV is deasserted, RXD<3:0> shall have no effect on the Reconciliation sublayer."

See also 215/51 ("148.4.2 Reconciliation Sublayer operation").

Cl **147** *SC* **147.3.7.1.1** *P* **185** *L* **51** # i-415

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PCS*

WRT to "..rx_cmd <= 'COMMIT' when a COMMIT indication is generated as specified". This statement makes support of PLCA RS in 10BASE-T1S PHY not optional. PLCA RS is advertised as optional RS. The use of COMMIT (in proposed changes to CL22) requires support of the optional RS, but this clause does not specify the optional RS bevior. This and two other shalls in this subclause makes it mandatoy implementation in all 10BASE-T1S PHYs.

SuggestedRemedy

Delete CL147.3.7.1.1 requirements.

Response *Response Status* **U**

REJECT.
The CRG disagrees with the commenter.
The decoding and signaling of the COMMIT and BEACON indications, and presentation of the signaling onto the MII does not make support of PLCA mandatory.
When the PLCA is not enabled or not supported, RS operation shall conform to C22, which would cause the signals to be ignored because the state diagrams they effect are not implemented, and the codes are defined as reserved with no action in existing clause 22, per IEEE Std 802.3-2018, 22.2.2.8:
"While RX_DV is deasserted, RXD<3:0> shall have no effect on the Reconciliation sublayer."

See also 215/51 ("148.4.2 Reconciliation Sublayer operation").

Cl **147** *SC* **147.3.7.1** *P* **185** *L* **15** # i-416

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **A** *PCS*

WRT ".. and Auto-Negotiation has achieved a good link." Auto-negotiation never achieves a good link. Auto-negotiation only negotiates capabilities.

SuggestedRemedy

Either delete the quoted text, or revise the text to describe appropriate condition while correcting for the error.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

Page 185, line 15:

Replace, "Auto-Negotiation has achieved a good link"

with, "Auto-Negotiation has completed"

Cl **147** *SC* **147.3.5** *P* **184** *L* **30** # i-417

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **A** *PCS*

[CSD/Compatibility] [Collision Detect, no assurance thereof]
In IEEE 802.3 project where CSMA/CD ("half-duplex") is supported, the collision detection method always has been specified, AND the assurance of 100% collision detection has been obvious, i.e. DC bias voltage rise from two or more transmitters using current source into a known resistance, or simple logical AND function of PMA TXD enable and RXD enable. This project, however, does not specify any collision detection method except to say 1) data corruption == collision, and 2) require, without specification, find two or more stations transmitting somewhere in the network and assert CRS during that time.

We all know what collision condition is, 'two or more simulanous transmittion into a shared collision domain" or there about. It is the responsibility of the project to specify how this is done, and also assure us that collision detection confidence is at least ar PAR with prior projects. This project does not specify the collsion detection method; therefore, it is incomplete.

That said, there are tactical issues with the current draft, and I do not wish to indicate that fixing any of these tactical issues would be satisfactory to requiring 100% assurance of collision detect. But here goes.
1) "corrupted signal while transmitting" == collision. This has an obvious flaw that one station may see random bit-error (e.g. from a local noise hit) and detect collision and backs-off, the other station does not see a collision 'corrupted signal while tranmitting" and completes transmission. Some receivers may see errored frames, some may not see errored frame. Result = non-determinstic behavior and lost packet.
2) Local strong TX and remote weak TX may not assure corruption.
- Max Attenuation: Attenuation of the TX signal on the nominal-length worst-case channel is 65% (3.7 db)
- Max TX power of local, so +20% P-P from 147.5.4.1 transmit output voltage is 1V +/- 20% P-P. + minimum droop and power spectral density (highest power allowed).
- Min TX power of remote, so -20% P-P, with max droop.
so power diff give another ~66%. Or ~43% max interference from remote, and it could be as little as ~35% considering droop.

In addition, COL assertion within 256 bit times from the begining of a transmission seems insufficient -- a minimum collision duration is 96 bit times. A min collision + IPG would allow a new transmission to occur at 192 bit times from the initial collision. So allowing collisoin to assert up to 256 bit time later, would potentially affect the subsequent packet transmission.

Without receiver specification we have NO CLUE how receiver would behave -- whether or not data corruption would be detected from the worst case remote TX interference.. And we've opted for TX and channel spec and leave RX to implementors to *recover* tx data over channel.

From 147.3.5 Collision Detection:
"When operating in half-duplex mode, the 10BASE-T1S PHY shall detect when a transmission initiated locally results in a corrupted signal at the MDI as a collision. When collisions are detected, the PHY shall assert the signal COL on the MII for the duration of the collision or until TX_EN signal is FALSE. The method for detecting a collision is implementation dependent but the following requirements have to be fulfilled. ..... a) The PHY shall assert COL within 256 bit times from the beginning of a transmission when one or more stations are transmitting at the same time.
b) The PHY shall assert CRS in the presence of a signal resulting from a collision between two or more stations."

SuggestedRemedy

The draft is incomplete without 100% collision detection specification. 100% defined to be as obvious as prior 802.3 CSMA/CD PHY projects. Please complete the draft by including collision detection specification.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Comment appears to comment on multiple issues, at least one of which is accomodated by comment i-248.

1. With regards to the 256 bit times delay in asserting COL, comment is accomodated by comment i-248.

Response to comment i-248 is:

ACCEPT IN PRINCIPLE.
Change:
====
a) The PHY shall assert COL within 256 bit times from the beginning of a transmission when one or more stations are transmitting at the same time.
b) The PHY shall assert CRS in the presence of a signal resulting from a collision between two or more stations.
====
to this:
====
a) The PHY shall assert COL when it is transmitting, and one or more other stations are also transmitting at the same time.
b) The PHY shall assert CRS in the presence of a signal resulting from a collision between two or more other stations.
====

The above response to comment i-248 effectively removes "within 256 bit times from the beginning of a transmission".

2. CRG disagrees with the remainder of the commenter's statements.
Various results have been presented to the Task Force, showing reliable collision detection on link segments using a variety of methods.
http://www.ieee802.org/3/cg/public/May2019/griffiths_3cg_01b_0519.pdf showed voltage-domain collision detection.
Additionally, analysis has been presented in
http://www.ieee802.org/3/cg/public/adhoc/beruto_3cg_collision_detection.pdf to address

issues of existence, feasibility and reliability of collision detect (CD).

The highlights of this analysis relevant to this comment are:
- Target level of reliability (less-than-or-equal-to one miss-categorization per lifetime of universe) can be achieved based on the current specs.
- In the voltage domain, in presence of the specified Gaussian noise, reliable CD can be achieved. The commenter's calculation seems to confirm most of these (see commenter's figure compared to pages 4 and 5 of the study), but CRG has difficulty following commenter's calculations in full.
- Using the properties of the DME, the self-synchronizing scrambler and network geometry (reach, exclusion of the repeaters) and other properties of the Ethernet frame, the same can be achieved.
- At least one implementation exists that meet these requirements in specified noise environment.

Cl **148** *SC* **148.4.6** *P* **214** *L* **22** # i-418

Kim, Yongbum NIO

Comment Type **TR** *Comment Status* **R** *PLCA_SCOPE*

[CSD/Compatibility] [Installed base compatibility] [PAR -- scope did not include MAC function in the project scope]
In PLCA data state diagram, COLLIDE state and related functional behaviors create a condition where in half-duplex, CSMA/CD, MAC transmits a packet, into a substantially busy network, but the collision condition does not result in a collision on the shared media. The collision signal is asserted only for the local node for the TX to collide-&-retry, while the simultaneous received signal that caused the collision is expected to be received as if there is no collision. The remote transmiter is not notified of contention on the network. This is a new behavior for an half-duplex MAC.

Legacy and installed base of Ethernet MACs expect to operate in 'architecturally' separate TX and RX, i.e. full-duplex datapath, while in half-duplex mode. Explicit allowance for implementations to optimize the datapath resources to only support simplex datapath operation is found in 4.1.2 where only obvious externally testable condition was inserted into the CL4 spec:

"4.1.2 CSMA/CD operation. ..... Transmit frame operations are independent from the receive frame operations. A transmitted frame addressed to the originating station will be received and passed to the MAC client at that station. This characteristic of the MAC sublayer may be implemented by functionality within the MAC sublayer or full duplex characteristics of portions of the lower layers."

And the clear architectural model vs implementations here in 1.1.3.1: "...The architectural model is based on a set of interfaces that may be different from those emphasized in implementations. One critical aspect of the design, however, shall be addressed largely in terms of the implementation interfaces: compatibility."

This new behavior specified in CL148 PLCA data state diagram is not compatible with many installed bases of 802.3 nodes with appropriate explosed MII interoperability test point that is also a phyical interface with specified connectors. Also as forementioned, the contention management and collision handling are MAC functions, not a part of Physical Layer that Reconsiiation Sub-layer belongs to.

Additional info could be found here : (slides 14~18 of):
http://www.ieee802.org/3/cg/public/Nov2018/Kim_3cg_01a_1118.pdf

SuggestedRemedy

This clause CL148 PLCA RS should be deleted. Alternatively re-architected to avoid introducing new normative behaviors to the installed base with exposed interoperability interfaces.

Response *Response Status* **U**

REJECT.
CRG disagrees with the commenter.
Commenter fails to show compatibility issues with conformant implementations and

incorrectly posits PLCA is a new MAC.

Additionally, the Task Force has previously considered the issues raised by the commenter and has also reviewed and evaluated contributions that rebut the commenter's assertions. See for example:
http://www.ieee802.org/3/cg/public/Jan2019/Tutorial_cg_0119_final.pdf,
http://www.ieee802.org/3/cg/public/Jan2019/baggett_3cg_01_0119.pdf
http://www.ieee802.org/3/cg/public/adhoc/beruto_3cg_plca_mac_compatibility.pdf
http://www.ieee802.org/3/cg/public/adhoc/beruto_3cg_plca_multiple_collisions.pdf