

Issues with 'PLCA sublayers' in the PAR scope and objectives related to clause 147 PHYs

G. ZIMMERMAN
CME CONSULTING
OCTOBER 1, 2026

Contributors

Tim Baggett, Microchip

Piergiorgio Beruto, OnSemi

Proposed PAR Scope

"The scope of the project is to make additions and modifications to the IEEE Std 802.3 PLCA sublayers to enhance the control of PLCA packet transmission scheduling, including management parameters and physical layer service access points."

PAR Scope needs to be clear outside of 802.3

Deconstructing the PAR scope

"The scope of the project is to make additions and modifications to the IEEE Std 802.3 PLCA sublayers to enhance the control of PLCA packet transmission scheduling, including management parameters and physical layer service access points."

Allowed: changing the "PLCA sublayers", management parameters and physical layer service access points

Purpose: to enhance control of "PLCA packet transmission scheduling"

Note – it MAY be advisable to move this purpose to the need for the project and out of the scope, but for the current time, it is in the rewording.

Issue 0: nits – need to spell out PLCA, commas

Abbreviations need to be spelled out on first use.

Oxford comma missing between management parameters and service access points.

Note - Insertion of the full name of PLCA makes the scope very wordy and suggests reordering of the sentence for clarity.

Recommendation – be ready to fix these.

Issue 1 (very minor): Putting the “need” in the scope

When a GOAL is in the PAR scope, whether something is really targeted at that goal may become a point of contention

- Witness 802.3dm

Consider removing “to enhance...scheduling” from the PAR scope, instead, and putting the following in the need section:

“Enhancements to IEEE Std 802.3 are needed to enable higher layers to control packet transmission when using PLCA.”

Recommendation - I’m going to suggest we live with this, and maybe fix the “scheduling” if commented on.

Issue 1 (minor) – Transmission Scheduling

“packet transmission scheduling” is likely read as within the scope of 802.1, not 802.3...

I do NOT believe we are doing scheduling protocols

- We say “to enhance the control of...”, so we are talking about the physical layer hooks, not the dot-1 protocols. Technically, we should be OK, if maybe not fully clear
- Consider deleting the word “scheduling”, “to enhance the control of packet transmission” – which means the same thing.

Recommendation – we can wait for a comment from dot 1 to fix this, but it should be an easy fix to delete “scheduling” if it comes up.

Issue 2: “PLCA Sublayers” - substantive

What are “PLCA Sublayers”? There is only ONE sublayer called PLCA in 802.3

This needs to be fixed, because it is unclear what we mean

Do we mean additions and modifications to:

- A. “the IEEE Std 802.3 PLCA Reconciliation Sublayer” (full stop)?
- B. “the IEEE Std 802.3 PLCA Reconciliation Sublayer” including additions of new client entity and/or control sublayers, or
- C. Are we including a PHY sublayer, such as the PCS encoding, in with the PLCA RS?

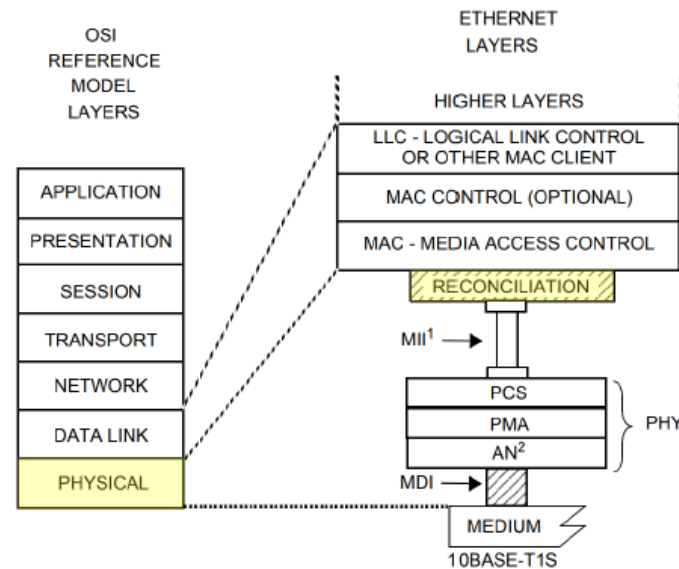
KEY QUESTION: is this project chartered or expecting to define a new PHY (Physical Layer Device)? Our PAR scope does not make this clear.

Where does PLCA fit?



Introduction

- PHY-Level Collision Avoidance is an optional Generic Reconciliation Sublayer (gRS) defined in clause 148.
- It's meant to improve CSMA/CD performance (throughput, latency, fairness) for multidrop, mixing-segment networks featuring a low number of nodes and high bus loads.
 - Not a replacement of CSMA/CD → PLCA actually relies on CSMA/CD functions
 - Not a replacement of TSN → TSN is expected to work on top of PLCA
- Working principle is to dynamically create transmit opportunities to avoid physical collisions on the line.
- Can be seamlessly switched to/from plain CSMA/CD
- Supported by 10BASE-T1S PHY (Clause 147) operating in multi-drop mode over mixing-segment.



Public Document

canovatech
The Art of Silicon Sculpting

<https://www.ieee802.org/3/cg/public/July2018/PLCA%20overview.pdf>

What's in the 10BASE-T1S/M PHY?

Half-Duplex Multidrop with support for collision avoidance (PLCA from 802.3cg) – Clause 148 RS with Clauses 147 & 188 PHYs

4B/5B encoding of MII signaling to the PCS

Encoding for PLCA signaling between Ethernet frames is defined and fixed in the PHY

DME Encoding and timing

PMA defines electrical and timing specifications onto the medium

- Refinement of Test Fixtures to work at new “TCI” line interface
- Tightening of lower transmit PSD mask to improve interoperability

IF we change the PCS...

Beware adding new control encodings

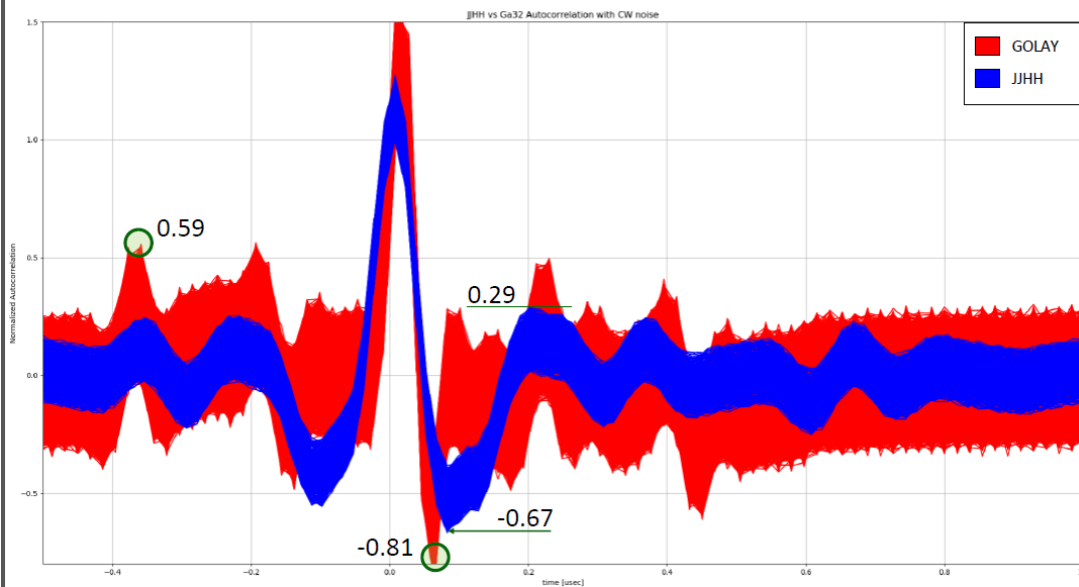
Encodings outside an Ethernet frame (when TX_EN = FALSE) need to be distinguished from the SYNC encodings

- Not just a bit-error detection
- Must occur without clock sync
- Must be robust to noise and sufficiently different from cg

802.3cg analyzed the SYNC sequence carefully against the BEACON and COMMIT sequences for correlation properties

Correlation properties matter if we are adding signalling outside the Ethernet frame

Ga32 vs JJHH Autocorrelation with CW noise



IEEE802.3cg

Page 13

BEACON

- PLCA BEACON is different from the packet preamble in the following sense:
 - There is no data after the BEACON signaling
 - No need for very precise synchronization: the PHY needs to reliably detect the **end** of a BEACON (TO_TIMER is synchronized on the end of a BEACON)
 - BEACON can be reliably detected by synchronizing on the four autocorrelation peaks within the 'NNNN' sequence
 - Important thing is not to confuse a JJHH for a NNNN sequence

IEEE802.3cg

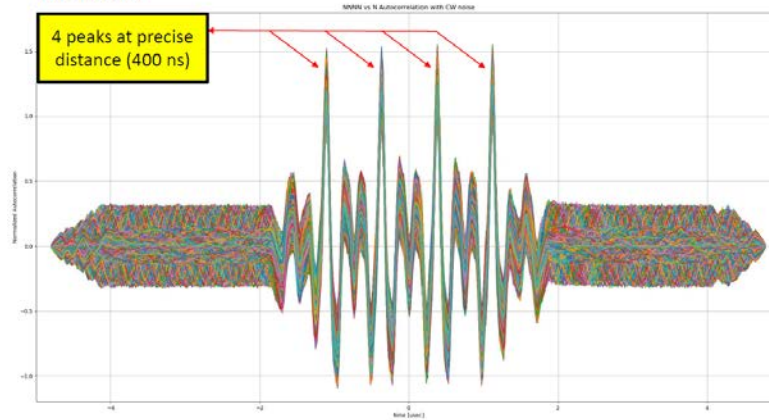
Page 15

From: https://www.ieee802.org/3/cg/public/May2018/beruto_3cg_03_0518.pdf

Making sure BEACON can't be confused

Correlation of 'N' within 'NNNN' with CW noise

TX: NNNN

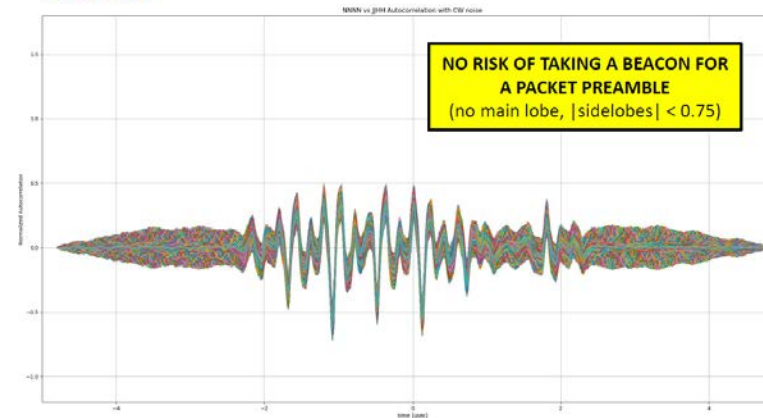


IEEE802.3cg

Page 16

Correlation of 'JJHH' within 'NNNN' with CW noise

TX: NNNN

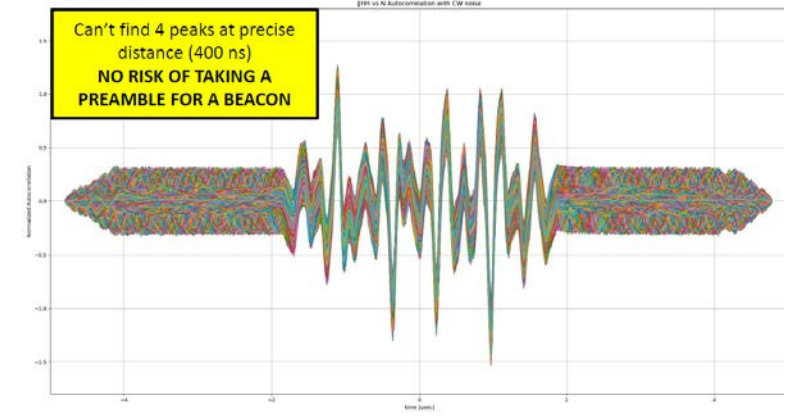


IEEE802.3cg

Page 18

Correlation of 'N' within 'JJHH' with CW noise

TX: JJHH



IEEE802.3cg

Page 17

From: https://www.ieee802.org/3/cg/public/May2018/beruto_3cg_03_0518.pdf

Adding a new signaling would change the PHY silicon's correlator

Requires analysis of all cross-correlation sequences, now more complex because there is another signal

Makes existing 10BASE-T1S/10BASE-T1M PMA/PCS silicon incompatible with the new solution (because it lacks the encoding)

Makes E-PLCA a “new PHY” project vs. a “physical layer” project that operates above the PHY (e.g., adding PLCA RS and control hooks.)

Is that what we really want? – IF SO, say it, if not – make it clear

PAR scope without a new PHY

Assuming we mean

A. “the IEEE Std 802.3 PLCA Reconciliation Sublayer” (full stop)

"The scope of the project is to make additions and modifications to IEEE Std 802.3 to enhance the control of packet transmission when using Physical Layer Collision Avoidance (PLCA), including the PLCA Reconciliation Sublayer, management parameters, and physical layer service access points."

PAR scope without a new PHY, but new sublayers above the PHY

Assuming we mean

- B. “the IEEE Std 802.3 PLCA Reconciliation Sublayer” including additions of new client entity and/or control sublayers, or

"The scope of the project is to make additions and modifications to IEEE Std 802.3 to enhance the control of packet transmission when using Physical Layer Collision Avoidance (PLCA) including the PLCA Reconciliation Sublayer (RS), non-MAC sublayers above the PLCA RS, management parameters, and physical layer service access points."

PAR scope with a new PHY

Do we mean additions and modifications to:

- C. Are we including a PHY sublayer, such as the PCS encoding, in with the PLCA RS?

"The scope of the project is to make additions and modifications to the IEEE Std 802.3 to enhance the control of packet transmission when using Physical Layer Collision Avoidance (PLCA) including the PLCA sublayer, associated Physical Layer Devices, management parameters, and physical layer service access points."

Note, there is a fourth variation which adds in the new sublayers above the PHY...

Discussion?

Thank You!
