P802.3cy OAM Proposal

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Reuse MultiGBASE-T1 OAM

WHY?

- https://www.ieee802.org/3/ch/public/jul18/wienckowski_3ch_02_0718.pdf
- Need a simple method to detect all link state failures
- Need a simple method to detect link state failures between link partners
- Need a standard method to read failed states

Reuse MultiGBASE-T1 OAM

HISTORY

- Developed as part of IEEE Std. 802.3bp-2016 and defined in 97.3.8
- Enhanced as part of IEEE Std. 802.3ch-2020 and defined in 149.3.9

➢ Extend to P802.3cy
  - As-is?
  - With enhancements?
  – TBD by the Task Force

Reuse MultiGBASE-T1 OAM

WHAT?

- https://www.ieee802.org/3/ch/public/sep18/wienckowski_3ch_01b_0918.pdf
- Layer 1 communication
- A method for a PHY to share its status with its Link partner
- Available when the MAC and other upper layers are not available
- Registers available through MDIO between the CPU and PHY, not dependent on MAC
- NOT Available when the LINK is down
- NOT Available when the link segment is faulted, causes the LIN to be down
- NOT A method to share upper layer status between ECUs

Reuse MultiGBASE-T1 OAM

- Clause 97 BASE-T1 OAM / Clause 149 MultiGBASE-T1 OAM

	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Symbol 0	Reserved	0	Reserved	Reserved	Reserved	Reserved	PingRx	PingTx	SNR<1>	SNR<0>
Symbol 1	Reserved	1	Valid	Toggle	Ack	TogAck	Message_Number<3:0>			
Symbol 2	Reserved	1	Message<0><7:0>							
Symbol 3	Reserved	1	Message<1><7:0>							
Symbol 4	Reserved	1	Message<2><7:0>							
Symbol 5	Reserved	1	Message<3><7:0>							
Symbol 6	Reserved	1	Message<4><7:0>							
Symbol 7	Reserved	1	Message<5><7:0>							
Symbol 8	Reserved	1	Message<6><7:0>							
Symbol 9	Reserved	1	Message<7><7:0>							
Symbol 10	Reserved	1	Message<8><7:0>							
Symbol 11	Reserved	1	Message<9><7:0>							
Symbol 12	Reserved	1	Message<10><7:0>							
Symbol 13	Reserved	1	Message<11><7:0>							
Symbol 14	RS(16,14) parity									
Symbol 15	RS(16,14) parity									

BASE-T1 OAM

MultiGBASE-T1 OAM Extension

Figure 149–22—OAM frame

Reuse MultiGBASE-T1 OAM

- 149.3.9.2.5 PHY health has the same text

97.3.8.2.5 PHY Health

The PHY Health (SNR<1:0>) is indicated in OAM<0><1:0>.

This status is set by the PHY to indicate the status of the receiver. The definitions of good, marginal, when to request idles, and when to request retrain are implementation dependent.

— 00: PHY link is failing and will drop link and relink within 2 ms to 4 ms after the end of the current 1000BASE-T1 OAM frame

— 01: LPI refresh is insufficient to maintain PHY SNR. Request link partner to exit LPI and send idles (used only when EEE is enabled)

— 10: PHY SNR is marginal

— 11: PHY SNR is good

Reuse MultiGBASE-T1 OAM

149B.3.1 MultiGBASE-T1 status valid

MultiGBASE-T1 status valid is indicated in OAM<10><7>.

— 0: Current OAM frame does not contain valid OAM status data, OAM<10><6:2>.

— 1: Current OAM frame contains valid OAM status data, OAM<10><6:2>.

149B.3.2 Power supply warning

Power supply warning is indicated in OAM<10><6>.

This status bit indicates the state of the local power supply(ies). The definitions of good and near the limit are implementation dependent. It is recommended that this status is set for a minimum of 100 ms.

— 0: Local PHY power supply(ies) is good.

— 1: Local PHY power supply(ies) is near the limit.

Reuse MultiGBASE-T1 OAM

149B.3.3 Internal temperature warning

Internal temperature warning is indicated in OAM<10><5>.

This status bit indicates the internal temperature of the PHY. The definitions of good and near the limit are implementation dependent. It is recommended that this status is set for a minimum of 100 ms.

— 0: Local PHY internal temperature is good.

— 1: Local PHY internal temperature is near the limit.

149B.3.4 No MAC messages warning

No MAC messages warning is indicated in OAM<10><4>.

This status bit indicates transmit data is not being received from the MAC. It is recommended that this status is set for a minimum of 100 ms.

— 0: PHY is receiving valid transmit messages from the MAC.

— 1: PHY is not receiving valid transmit messages from the MAC.

Reuse MultiGBASE-T1 OAM

149B.3.5 Degraded link segment

Degraded link segment is indicated in OAM<10><3>.

This status is set to indicate the status of the link segment. The definitions of good and degraded are implementation dependent. It is recommended that this status is set for a minimum of 100 ms.

— 0: Link segment is good.

— 1: Link segment is degraded.

149B.3.6 Polarity inversion

Polarity inversion is indicated in OAM<10><2>.

This status is set to indicate the conductors of the pair are swapped and the PHY has accounted for this.

— 0: No polarity inversion detected.

— 1: Polarity inversion detected.

Reuse MultiGBASE-T1 OAM

- There is a desire to know whether frames are transmitted without errors
- This cannot be detected by the transmitter
- The receiver knows if the frames are received without error
- Most errors occur due to noise in the environment during propagation through the medium
- Therefore, the LP receive error count is a good indicator of the number of frames transmitted with errors

149B.3.10 Receive error counter (REC)

REC<15:0> is indicated in OAM<13:12><7:0>.

This two-byte symbol indicates the number of RS-FEC frame block errors, both correctable and uncorrectable, that have been seen by the receiver since the REC was last cleared. This counter should be cleared when clear REC (OAM<10><1>) is received as 1. If the counter reaches 0xFFFF, it stays at 0xFFFF until cleared by clear REC. See Figure 149B–2 and Figure 149B–3 for additional details on the behavior of this counter in conjunction with clear REC and REC cleared.

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149B.3.8 Clear REC

Clear REC is indicated in OAM<10><1>.

This status is set to indicate the link partner should clear the receive error counter (REC) in OAM<13:12><7:0>.

— 0: Do not clear REC.

— 1: Clear REC.

149B.3.9 REC cleared

REC cleared is indicated in OAM<10><0>.

This status is set to indicate the REC (in OAM<13:12><7:0>) has been cleared.

— 0: REC has not been cleared and is counting errors.

— 1: REC has been cleared, set to 0x0000, and has resumed counting errors.

Reuse MultiGBASE-T1 OAM

Changes

- We don't yet know the FEC details. If these are not 10-bit symbols, we will need to adjust the number of bits in the OAM symbol to match. This can be easily done if it is 9 or more bits.

- P802.3cy will not only have 1-pair, how do we deal with this?
  - Each "lane" repeats the MultiGBASE-T1 OAM?
  - Each "lane" repeats some of the MultiGBASE-T1 OAM, e.g., power supply warning, polarity swap, etc.; and some parameters are sent on only 1 "lane", e.g., REC, no MAC messages, etc.?
  - Does the laning choice make a difference if we consider the three options in https://www.ieee802.org/3/cy/public/adhoc/zimmerman_3cy_01_02_23_21.pdf?

Reuse MultiGBASE-T1 OAM

Next Steps

- Do we want to include an OAM? (Straw Poll)
- Do we want to include the parameters defined in 802.3ch? (Straw Poll)
- Investigate impact of Laning Split decision on OAM
  - For each option, OAM in “orange block”, in “green block”, or split between the two
  - If not done in the device with the MDI interface
    - Are additional parameters needed?
    - Are some parameters not available?
    - Is the OAM different for different speeds if the split is different for different speeds?
  - If done in the device with the MDI interface
    - Are additional parameters needed for communication between blocks?
    - Is the OAM different for different speeds if the split is different for different speeds?

Questions?

Thank you