

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190	SC 190.3.2.7	P71	L 25	# 25
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Slavick, JeffBroadcom

Comment Type	TR	Comment Status	R	RS-FEC
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The statement that $m_i,0$ is the first bit transmitted is duplicative with the last sentence of this sub-section (pg71 lin 52).

SuggestedRemedy

Remove " $m_i,0$ is the first bit transmitted"

Response	Response Status	U
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REJECT.

CRG disagrees with commenter.

The two statements are similar but not identical. The first usage refers to message bits in the defined message symbol. Deleting it would remove the meaning of the notation. The second usage (at line 52) relates to the construction of the full codeword, not just the message symbols. Keeping both adds clarity and does no harm.

CI 190	SC 190.3.2.7	P71	L 43	# 28
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Slavick, JeffBroadcom

Comment Type	TR	Comment Status	R	Editorial
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The statement that $p_i,0$ is the first bit transmitted is duplicative with the last sentence of this sub-section (pg71 lin 52).

SuggestedRemedy

Remove " $p_i,0$ is the first bit transmitted"

Response	Response Status	U
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REJECT.

CRG disagrees with commenter.

The two statements are similar but not identical. The first usage refers to parity bits in the defined parity symbol. Deleting it would remove the meaning of the notation. The second usage (at line 52) relates to the construction of the full codeword, not just the parity symbols. Keeping both adds clarity and does no harm.

CI 190	SC 190.3.2	P63	L 30	# 51
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He, XiangHuawei Technologies

Comment Type	TR	Comment Status	A	Editorial
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In Figure 190-4. The "Low-latency/RS-FEC select" is never mentioned anywhere in the document, and the mux/switch box is not an accurate illustration in the figure. When RS-FEC is enabled, the RS-FEC encoder in the dashed box is used, and this mux has to be switched to the upper path. When RS-FEC is disabled, the RS-FEC in the dashed box is not used and the mux has to be switched to the lower path.

SuggestedRemedy

Suggest to rename "Low-latency/RS-FEC select" to "RS-FEC enable". Clearly mark 1 on the upper path, and 0 on the bottom path.

Response	Response Status	W
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ACCEPT.

CI 190	SC 190.3.2	P63	L 21	# 52
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He, XiangHuawei Technologies

Comment Type	TR	Comment Status	A	RS-FEC
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"Used when $N=8$, bypassed when $N=2$ " on top of the dashed box seems odd. In 190.3.2.1, line 5 of page 62, it clearly says "When RS-FEC is disabled, N is 2⁰... When RS-FEC is enabled, N is 8⁰". The actual thing determining which path is used is "RS-FEC enable". The number N is not an input, but a result.

SuggestedRemedy

Suggest to change the sentence on top of the dashed box as "Used when RS-FEC is enabled, bypassed when RS-FEC is disabled".

Response	Response Status	W
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ACCEPT.

CI 190	SC 190.3.7	P99	L1	# 53
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<i>Comment Type</i>	ER	<i>Comment Status</i>	A	<i>Editorial</i>
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SuggestedRemedy

Response	Response Status	W
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Delete 190.3.7 header.

CI 190 SC 190.4 P109 L27 # 54

<i>Comment Type</i>	ER	<i>Comment Status</i>	R	<i>Editorial</i>
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SuggestedRemedy

Response	Response Status	W
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Cl 190	SC 190.3.6	P88	L33	# 55
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<i>Comment Type</i>	ER	<i>Comment Status</i>	R	<i>Editorial</i>
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SuggestedRemedy

Response	Response Status	W
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CI 190 SC 190.4.9 P103 L19 # 56

<i>Comment Type</i>	ER	<i>Comment Status</i>	R	<i>Editorial</i>
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SuggestedRemedy

Response	Response Status	W
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Page 2 of 8
10/24/2025 8:13:59 AM

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 1 SC 1.4.341a P21 L40 # 59

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A Editorial

The new definition FOLLOWER PHY incorrectly refers to 1.4.389 (which is "master") instead of 1.4.535 ("slave").
Also, the referenced definition says nothing about what "follower" is; the reader needs to read Annex K (which is informative) to find what this new term means.
Also, existing definitions in 1.4 do not refer to other definitions by number but rather by name. For example, "1.4.204 Base Page: See: Base link codeword."

In this case the new term is synonymous to "Slave Physical Layer Device". in similar cases, the abbreviation "Syn:" is used (see 1.4.359 in-band signaling, 1.4.468 Physical Layer entity, 1.4.544 switch).

Similarly for 1.4.371a "LEADER PHY" (where the reference isn't wrong, but the rest of the comment still applies).

SuggestedRemedy

Change the definition in 1.4.341a to
"syn: Slave Physical Layer Device. See also Annex K."
Change the definition in 1.4.371a to
"syn: Master Physical Layer Device. See also Annex K."

Response Response Status W

ACCEPT.

CI 45 SC 45.2.1.236a.3 P28 L3 # 64

Ran, Adeo Cisco Systems

Comment Type TR Comment Status R Management

"low-power ability" is not referenced anywhere in Clause 190 (although there is one instance of "low power mode", without a hyphen, in 190.4.1). Is it the same as "low-power idle" (part of EEE)?

SuggestedRemedy

If it is a separate function, it should be stated clearly to avoid confusion, and a specification of the behavior in this mode should be added in clause 190. If it is the LPI of EEE, please rename it or clarify in some other way.

Response Response Status W

REJECT.

This mode is described in nearly every PHY in 802.3 (over 100 instances in IEEE Std 802.3). It is a low-power non-operational state (e.g., software power down - Clause 45 bit 1.1.1). A change would make the reader question whether it was something different.

CI 104 SC 104.6.2 P40 L8 # 70

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A Editorial

The last sentence in the amended paragraph mentions only PDs, but the existing text in 104.6.2 says "The PI for Type E PSEs and PDs". I assume PSEs for Type E are out of scope of this amendment, so they should still be included; I assume also for type G, but this may be intentional?

SuggestedRemedy

Correct the text as necessary to address PSEs.

Response Response Status W

ACCEPT IN PRINCIPLE.

(this text was amended by 802.3dd - the editing instruction neglects that. PSE's were excluded by 802.3dd

insert "(as amended by IEEE Std 802.3dd-2022)" in editing instruction, to read:
Change the first paragraph of 104.6.2 (as amended by IEEE Std 802.3dd-2022) as shown:

CI 190 SC 190.1.2 P45 L6 # 72

Ran, Adeo Cisco Systems

Comment Type TR Comment Status R Editorial

Clause 4 specifies a CSMA-CD MAC (half duplex) but this PHY operates in full-duplex (as stated in 190.1.3).
Shouldn't it be Annex 4A instead?

SuggestedRemedy

Change to Annex 4A and the appropriate title.

Response Response Status W

REJECT.

CRG disagrees with the commenter.
The Clause 4 MAC supports full duplex operation. Annex 4A is the simplified full duplex MAC.

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190 SC 190.1.3 P45 L51 # 75

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A Editorial

"RS-FEC is not compatible with all applications since it results in a significant increase in latency"

This is not a normative statement, and it goes without saying (this PHY as a whole, or any PHY, or anything, isn't compatible with _all_ applications).

Similarly for the statement "EEE is not compatible with all applications since it may result in a significant increase in latency and in latency variability" in the next paragraph.

SuggestedRemedy

Move these sentences into an informative NOTE, or delete them altogether.

Response Response Status W

ACCEPT IN PRINCIPLE.

Change "RS-FEC is not compatible with all applications since it results in a significant increase in latency" to

"RS-FEC results in a significant increase in latency."

and change "EEE is not compatible with all applications since it may result in a significant increase in latency and in latency variability" to

"EEE can result in a significant increase in latency and latency variability." in the next paragraph.

CI 190 SC 190.2.2.5.1 P54 L6 # 77

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A PMA

For PMA_UNITDATA.indication, the possible values of rx_symb are not provided (unlike PMA_UNITDATA.request in 190.2.2.4.1). Are these the same set (ternary symbols)? Or is it a soft input for the PCS to decode?

SuggestedRemedy

Please clarify.

Response Response Status W

ACCEPT IN PRINCIPLE.

Insert :The rx_symb parameter takes on one of the following values:{-1, +1} when the PHY is in training mode{-1, 0, +1} when the PHY is in idle mode or in normal operation

CI 190 SC 190.3.2.4 P65 L19 # 82

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A Editorial

The value "-" for "previous transfer" in the 4th and 5th rows is not one of the categories defined in Table 190'1.

SuggestedRemedy

Clarify or correct if necessary.

Response Response Status W

ACCEPT IN PRINCIPLE.

Add at the bottom of the table, "NOTE - and em-dash indicates that any value qualifies."

CI 190 SC 190.3.2.3 P64 L16 # 84

Ran, Adeo Cisco Systems

Comment Type TR Comment Status A PCS

"The bits of a transmitted or received block are labeled tx_coded<0:2N> and rx_coded<0:2N>"

The notations tx_coded<0:2N> and rx_coded<0:2N> do not appear anywhere other than in this subclause.

In 190.3.2.6 tx_coded has two indices, e.g., tx_coded<i><j>, where j is from 0 to 8N, so apparently tx_coded is an array of blocks; the size is different and the bit order is reversed, tx_coded<i><8N:0>.

In 190.3.6.1.2 it is tx_coded<0:8N> (same order here but different size).

I assume the size is 8N+1, and the order should be consistent; MSB on the left is more common.

Note that rx_coded doesn't appear anywhere else. Should it be rx_mii?

SuggestedRemedy

Change to tx_coded<8N:0> and rx_coded<8N:0>. Make the bit order consistent across the clause.

Change rx_coded to whatever it should be.

Response Response Status W

ACCEPT IN PRINCIPLE.

Change tx_coded<0:2N> to tx_coded<0:8N> (the block has 8N+1 bits). delete "and rx_coded<0:2N>" and "and rx_coded<0>" and delete "or received" at P64 L16 (there is no reference to rx_coded).In 190.3.2.6.1, (P70 L18) change "tx_coded<i><8N:0> is the i-th (8N)B/(8N+1)B block" to "tx_coded<i><0:8N> is the i-th (8N)B/(8N+1)B block"

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general

COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn

SORT ORDER: Comment ID

Comment ID 84

Page 4 of 8

10/24/2025 8:13:59 AM

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190 SC 190.2.2.13.1 P57 L44 # 87
Ran, Adeo Cisco Systems
Comment Type TR Comment Status A Editorial
Is "control character" (here, also used in 190.3.2.2 and 190.3.2.3) identical to "control octet" (used in 190.3.2.4, 11 times)? Neither of these terms seems to be defined.
SuggestedRemedy
If the terms are identical, please use one term consistently. If not, please add text to clarify the difference.
Preferably, add a definition or a reference to an existing one.
Response Response Status W
ACCEPT IN PRINCIPLE.
Replace "control octet" with "control character" globally (and control octets with control characters)

CI 190 SC 190.3.2.8 P73 L23 # 93
Ran, Adeo Cisco Systems
Comment Type ER Comment Status A PCS
"as in Clause 40"
Reference is not specific enough. I assume the intent is 40.3.1.3.2, which contains the same equations for Sy_n and Sx_n, but it does not seem to be exactly the same for Sg_n. For Sy_n and Sx_n, either refer to an existing specification or note (informatively) that it is the same as an existing one.
SuggestedRemedy
Either change to "as specified in 40.3.1.3.2", or delete this phrase and add a paragraph "NOTE" The specification for Sy_n and Sx_n is identical to the one in 40.3.1.3.2".
Response Response Status W
ACCEPT IN PRINCIPLE.
Change "as in Clause 40" to "as specified in 40.3.1.3.2".
Add at P73 L25 (after paragraph): "NOTE" The specification for Sy_n and Sx_n is identical to 40.3.1.3.2".

CI 190 SC 190.3.6.1.1 P89 L38 # 106
Ran, Adeo Cisco Systems
Comment Type TR Comment Status R RS-FEC
The assigned values of RFER_CNT_LIMIT and RFRX_CNT_LIMIT result in hi_rfer being asserted when the RS-FEC block error ratio is about 16/88 or about 18% (assuming uncorrectable codewords occur randomly). This means 18% of the traffic can be lost (frame loss ratio higher than 1e-1!) without asserting hi_rfer, which makes it a very crude indication (the link will likely become useless at this performance or even lower BER) and does not match the stated BER/FLR requirements in 190.5.5.1.
Allowing a link to operate with such high error probability would raise MTTFPA concerns, because there is a non-negligible probability (with this codeword error probability and simple error model assumptions, estimated as ~0.2%) that a codeword with more than 3 errors is not detected as uncorrectable, but instead miscorrected to create 2t=6 symbol errors.
It practically becomes an indication of a dropped link, but this should already be detected by other means (pcs_status, implementation dependent) for the case where RS-FEC is not available.
Note that the PCS in clause 119 and similar ones asserts loss of alignment (and pcs_status=NOT_OK) upon reception of 3 consecutive uncorrectable RS-FEC codewords.
SuggestedRemedy
Increase RFRX_CNT_LIMIT to create a ratio based on the expected worst-case performance (e.g. frame loss ratio). For example, assuming the maximum allowed frame loss ratio is 1e-6 (very relaxed compared to about 1e-10 in BASE-R PHYs), RFRX_CNT_LIMIT should be RFER_CNT_LIMIT*1e6 or about 2^24.
If the current value is retained, add a NOTE stating that with random error assumptions, high_rfer will be asserted at a codeword error ratio of approximately 18% or above. (if the value is changed, add the note with the resulting probability).
Response Response Status W
REJECT.
The analysis uses a stationary error model - when in this channel it would more likely be burst errors, common to known causes in the application space. The analysis also neglects the fact that this high RFER count goes along with marking the blocks as Errors, guaranteeing that they will be discarded and counted at the MAC, indicating a bad link. Note that this is only a 100 Mbps link, so the MTTFPA calculation is much more generous than at 100 Gbps allowing monitoring of the MAC counters and reacting to a bad link.

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190 SC 190.3.3.2 P79 L 22 # 107

Ran, Adee Cisco Systems

Comment Type TR Comment Status R RS-FEC

There is no specification of the RS-FEC decoder correction capability. I assume there is an expectation that the decoder actually corrects errors, but this is not written anywhere.

with the current specifications, the decoder could just ignore the parity symbols and extract the payload, and this would be compliant. Or it could just mark codewords as invalid if any error is detected (nonzero syndrome), never correcting anything. This would have very low latency but it's not what people would expect.

The code specified in 190.3.2.7 has $2t=128-122=6$ so a decoder is expected to be able to correct up to $t=3$ symbol errors (with 8-bit symbols).

SuggestedRemedy

Add a requirement that the RS-FEC decoder shall be able to correct up to $t=3$ symbol errors (the text in 119.2.5.3 can be used as a reference).

Response Response Status W

REJECT.

CRG Disagrees with the commenter.

RS-FEC specifications integral to the PCS of BASE-T1 PHYs are different from those in high-speed PHYs where RS-FEC has been defined as a separate sublayer. Performance is integrated into the receiver. This has a long history with 1000BASE-T, MultiGBASE-T, and has continued in 1000BASE-T1 and MultiGBASE-T1 PHYs. Separate specification from the receiver performance is not required because the sublayer cannot be separated from the PHY.

CI 190 SC 190.5.2 P109 L43 # 123

Ran, Adee Cisco Systems

Comment Type TR Comment Status R Test Modes

I assumed that all test modes described are normatively required, but then realized that the even-numbered modes are optional, conditional of "increased transmit level" which is not defined anywhere. And it is not explicitly stated that the odd-numbered test modes are normatively required. The RS-FEC support adds another level of complexity.

It looks like there are actually 2 PMA-specific test modes (1 and 3) and 5 PMA+PCS test modes (5, 7, 9, 11, and 13; RS-FEC enable or disable is purely a PCS control), plus a bit that controls the transmit level. I assume there are reasons to define the test modes this way, and the suggested remedy is based on that (but a cleaner scheme separating the PCS test modes from the PMA test modes should be considered).

SuggestedRemedy

Change from
"The test modes described in this subclause are provided to allow testing of the transmitter" to
"The test modes described in this subclause are provided to allow testing of the transmitter. Test modes 1, 3, 5, 7, and 11 shall be provided by all PHYs. Test modes 2, 4, 6, and 12 shall be provided if the PMA supports the optional increased transmit level (see <reference>). Test modes 9, 10, 13, and 14 shall be provided if the PCS supports RS-FEC (see <reference>)".

Use references to the subclause that specify the increased transmit level and RS-FEC as options (are there MDIO bits to indicate support?), or add new subclauses if there are no such specifications.

Response Response Status W

REJECT.

Test modes are required in all cases.
Even numbered test modes are not defined if increased transmit level is not supported (see P110 L15), but the setting still exists.If RS-FEC encoding is not supported, test modes 9 and 10 are undefined.

(P110 L32), but again, the setting still exists. Similarly for test modes 13 & 14 (P110 L39)

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190 SC 190.5.4.4 P113 L 26 # 125

Ran, Adee Cisco Systems

Comment Type TR Comment Status R PMA Electrical

"For the 1.0 Vpp operating mode, in test mode 7 <Ó> the transmit power shall be 1.0 ^a 1.2 dBm"

1 V PtP (specified in 190.5.4.1) with PAM2 modulation on a 100 Ohm load delivers $V^2/R=1^2/100 = 0.01 \text{ W} = 10 \text{ mW}$; this is 10 dBm prior to pulse shaping. The PSD mask in figure 190-26 shows a mild low-pass response with about 4 dB attenuation at the Nyquist frequency (40 MHz) - not a lot more than square pulse shaping - how does that get anywhere near 1 dBm?

I may have got something completely wrong but it seems that the voltage and power specs don't match.

Similarly for the 2.0 Vpp mode (which should be just 6 dB higher - why is it 7 dB?)

SuggestedRemedy

If I'm not wrong - update whatever is necessary. (If I am wrong but it's not easy to explain why - consider adding a clarifying NOTE).

Response Response Status W

REJECT.

CRG DISAGREES WITH COMMENTER. Commenter makes an error in his calculation and uses 1 Vpeak, PAM2 not 1Vpp PAM3 (0.5Vp, with 1.76dB PAR). $V^2/100\text{ohm} = 2.5\text{mW}$ (4dBm) minus 1.76dB PAR = 2.2 dBm, which fits the upper end fo the transmit power limit. The lower limit is for pulse shaping. Note that the difference between a 1st order nyquist filter and unfiltered pulse is > 1 dB...

CI 190 SC 190.5.5.3 P116 L 41 # 128

Ran, Adee Cisco Systems

Comment Type TR Comment Status A PMA Electrical

The NOTE includes an allowed ("may") modification the test conditions; this is not informative text.

SuggestedRemedy

Move this paragraph to normal subclause text. If desired, add a NOTE to explain the motivation for this allowance (e.g. "this allowance is provided to address limitations in noise generators").

Response Response Status W

ACCEPT IN PRINCIPLE.

Change "may be adapted" in the NOTE below figure 190-28 to "should be adapted". (the note should be a recommendation of what to do, not a permission)

CI 190 SC 190.6.1 P117 L 15 # 132

Ran, Adee Cisco Systems

Comment Type TR Comment Status A EZ

[auto-negotiation is used] "To negotiate EEE capabilities as specified in 190.1.3.3."
But per 190.1.3.3 EEE capability are negotiated in InfoField as part of the training - which is after auto-negotiation.

SuggestedRemedy

Delete item d)

Response Response Status W

ACCEPT.

CI 190 SC 190.6.1 P117 L 16 # 133

Ran, Adee Cisco Systems

Comment Type TR Comment Status A Reduced TX level

[auto-negotiation is used] "To negotiate the low <Ó> and high <Ó> operating modes ..."
How is that done?
(I reckon Table 98B'1 has something to do with it but what are the rules for the negotiation? There should probably be a new subclause in clause 98)

SuggestedRemedy

Provide a reference to the subclause that contains the information (add a new one if necessary).

Response Response Status W

ACCEPT IN PRINCIPLE.

Add to P117 L16 (item e) at the end, "(see 98B.3 and 98B.4)."

IEEE P802.3dg D2.0 100BASE-T1L Initial Working Group ballot comments

CI 190 SC 190.6.2 P117 L 22 # 136

Ran, Adee Cisco Systems

Comment Type TR Comment Status R Management

"One PHY should be configured as LEADER and one PHY should be configured as FOLLOWER"

This is not just a recommendation ("should"); it is an unavoidable situation if proper operation is assumed, as described in the next paragraph.

SuggestedRemedy

Change to "For successful operation of a link between two PHYs, one PHY must be configured as LEADER and the other as FOLLOWER". Move this sentence to the second paragraph before "In the case where <O>".

Response Response Status W

REJECT.

The configuration is not necessarily a forced configuration. It may be resolved as a preference in auto-negotiation, according to Table 98-4. This same language and technique has been used successfully for over 20 years (including 1000BASE-T) and resulting in successful BASE-T PHY links without misunderstanding.

CI 190 SC 190.7.1.1 P120 L 6 # 137

Ran, Adee Cisco Systems

Comment Type TR Comment Status A Link Segment

"Each 100BASE-T1L link segment" - within what set of segments?

I initially interpreted it as "each segment between connectors", but based on the text in 190.7.1.4.2 I suspect the intent is each differential pair within a bundle of differential pairs (as in a CAT6 cable). But I'm not sure this is relevant in general.

Similarly in 190.7.1.2, 190.7.1.4.1, 190.7.1.4.2

SuggestedRemedy

If there is no special meaning to "each", change "each link segment" to "a link segment". Otherwise, clarify what "each" refers to (within what set of segments?) Apply in all instances of "each 100BASE-T1L link segment".

Response Response Status W

ACCEPT IN PRINCIPLE.

Change "each 100BASE-T1L segment" to "the link segment" in 190.7.1.2, 190.7.1.4.1 and 190.7.1.4.2 (capitalize as appropriate).

Note - the language of "each" seems to have slipped over from multi-pair BASE-T to single-pair ethernet in clause 97, 149, and 165. Commenter may consider maintenance.

CI 190 SC 190.7. P117 L 35 # 138

Ran, Adee Cisco Systems

Comment Type TR Comment Status R Link Segment

"The term "link segment" used in this clause refers to a single balanced pair of conductors operating in full duplex."

This reads like a length of cable, and connectors are not mentioned; but the next paragraph talks about "supports up to five in-line connectors". It is unclear whether a channel comprising several cables with connectors between them is considered one link segment or multiple link segments.

Also I think "operating in full duplex" is a property of the PHY (and the protocol used), not of the link segment.

SuggestedRemedy

Please specify more clearly what a link segment is. A figure showing the boundaries of the link segment in a connectorized channel would help.

Delete "operating in full duplex".

Response Response Status W

REJECT.

Link Segment is defined in 1.4 as "The point-to-point full-duplex medium connection between two and only two Medium Dependent Interfaces (MDIs)."

That would include any connectors, which are, of course, also conductors. The medium is capable of full-duplex conduction of signals. It doesn't have one-way amplifiers or directional couplers in it. This same language has been used successfully for over 20 years (including 1000BASE-T) and resulting in successful BASE-T PHY links without misunderstanding.