Signals and streams

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Issue

- 802.3 has multiple instances of the terms "signal stream" and "electrical streams"
  - Mostly in specific subclauses (PMD transmit and receive functions)
  - A few additional instances
- In all cases, these terms refer to continuously modulated electrical or optical signals
- But in communication parlance, "stream" typically denotes a series of discrete entities (bits, symbols, frames, blocks…)
- The appropriate term for PMD inputs or outputs is simply "signal".
  - This term is used in several clauses instead of "signal stream", apparently corrected from previous text, as shown in the next slide.
- 802.3 has a definition of "stream" that does not fit this usage.

  1.4.543 stream: The Physical Layer encapsulation of a Media Access Control (MAC) frame. Depending on the particular PHY, the MAC frame may be modified or have information appended or prepended to it to facilitate transfer through the Physical Medium Attachment (PMA). Any conversion from a MAC frame to a PHY stream and back to a MAC frame is transparent to the MAC. (See IEEE Std 802.3, Clause 23 and Clause 24.)

  - "signal stream" is undefined.
- We need consistency and clarity.

Instances of "signal stream"

- 2 instances in one subclause in pre-PMD clause 7
  - **7.3.1.2:** "The CS0 signal is a signal stream of frequency equal to the bit rate (BR). The CS1 signal is a signal stream of frequency equal to half of the bit rate (BR/2)."
- 98 instances in PMD clauses
  - All in the "PMD transmit function" and "PMD receive function" subclauses, or related PICS
    - Additionally, 6 instances of "electrical stream" in these subclauses in 84 and 85
    - See examples on next slide…
- 4 instances in AUI-C2M annexes.

Examples of different text in similar subclauses

53.4.2 PMD transmit function

The PMD Transmit function shall convert the four electronic bit streams requested by the PMD service interface message PMD_UNITDATA.request (tx_bit<0:3>) into four separate optical signal streams. The four optical signal streams shall then be wavelength division multiplexed and delivered to the MDI, all according to the transmit optical specifications in this clause. The higher optical power level in each signal stream shall correspond to a tx_bit = ONE.

122.5.2 PMD receive function

The PMD Receive function shall demultiplex the composite optical signal received from the *MDI* into n separate optical signals. The n optical signals shall then be converted into n symbol streams for delivery to the PMD service interface using the messages PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_n–1.indication, all according to the receive optical specifications in this clause. The higher optical power level in each signal shall correspond to rx_symbol = three and the lowest shall correspond to rx_symbol = zero.

71.6.2 PMD transmit function

The PMD Transmit function shall convert the four logical bit streams requested by the PMD service interface message PMD_UNITDATA.request (tx_bit<0:3>) into four separate electrical signal streams. The four electrical signal streams shall then be delivered to the MDI, all according to the specifications in 71.7.1. A positive output voltage of SLn<p> minus SLn<n> (differential voltage) shall correspond to tx_bit = ONE.

92.7.2 PMD Transmit function

The PMD transmit function shall convert the four bit streams requested by the PMD service interface messages PMD:IS_UNITDATA_*i*.request (*i*=0 to 3) into four separate electrical signals. The four electrical signals shall then be delivered to the MDI, all according to the transmit electrical specifications in 92.8.3. A positive differential output voltage (SL*i*<p> minus SL*i*<n>) shall correspond to tx_bit = one.

Similar text to that in 53 is used in most, but not all subsequent optical PMD clauses. Some subclauses (e.g. 122 receive function shown above) have apparently been corrected, but it's inconsistent.

The text from clause 71 was re-used with slight modification in 84 and 85. Clause 92 and all subsequent electrical PMD clauses (93, 94, 110, 111, 136, 137) do not use "signal stream".

The text seems to have been corrected in clause 92, and then inherited consistently.

Proposed changes (1)

- Change "signal stream" to "signal" and "signal streams" to "signals":
  - In **PMD transmit function** subclauses: 53.4.2 (×4), 54.5.2 (×2), 71.6.2 (×2), 86.5.2 (×3), 87.5.2 (×3), 88.5.2 (×3), 89.5.2 (×2), 95.5.2 (×3), 112.5.2 (×3), 114.5.2 (×3), 121.5.2, 122.5.2, 123.5.2, 124.5.2, 138.5.2 (×4), 139.5.2 (×3), 140.5.2 (×3), 150.5.2 (×4), 151.5.2.
  - In **PMD receive function** subclauses: 53.4.3 (×4), 54.5.3 (×2), 71.6.3 (×2), 86.5.3 (×2), 87.5.3 (×4), 88.5.3 (×4), 89.5.3 (×2), 95.5.3 (×2), 112.5.3 (×2), 114.5.3 (×2), 121.5.3, 123.5.2, 124.5.3, 138.5.3, 139.5.2, 140.5.3, 150.5.3
  - In **PICS items**: 53.15.4.1 (×3), 54.10.4.1, 71.10.4.2, 85.13.4.1, 86.11.4.1, 87.13.4.1, 88.12.4.1
- Change "electrical streams" to "electrical signals":
  - In **PMD transmit function** 84.7.2 and **PMD receive function** 84.7.3
  - In **PMD receive function** 85.7.3 (×2)

Proposed changes (2)

- Change the first paragraph of 85.7.2 as shown:

85.7.2 PMD Transmit function

The 40GBASE-CR4 PMD Transmit function shall convert the four bit streams requested by the PMD service interface messages PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request into four separate electrical ~~streams~~ signals. The four electrical signals ~~streams~~ shall then be delivered to the MDI, all according to the transmit electrical specifications in 85.8.3. A positive output voltage of SL<p> minus SL<n> (differential voltage) shall correspond to tx_bit = one. The 100GBASE-CR10 PMD Transmit function shall convert the ten bit streams requested by the PMD service interface messages PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_9.request into ten separate electrical signals. The ten electrical signals ~~streams~~ shall then be delivered to the MDI, all according to the transmit electrical specifications in 85.8.3. A positive output voltage of SL<p> minus SL<n> (differential voltage) shall correspond to tx_bit = one.

Proposed changes (3)

83E.3.3.2.1 Host stressed input test procedure

<…> The stressed signal is generated by adding sinusoidal jitter, random jitter, and bounded uncorrelated jitter **to a clean signal**. The amount of applied peak-to-peak sinusoidal jitter used for the host stressed input test is given in Table 83E–5. Bounded uncorrelated jitter provides a source of bounded high probability jitter uncorrelated with the signal stream. This jitter stress source may not be present in all stressed pattern generators or bit error ratio testers. It can be generated by driving the pattern generator external jitter modulation input with a filtered PRBS pattern.<…>

- Change "the signal stream" to "the clean signal".
- Apply also to the similar text in 83E.3.4.1.1.

Proposed changes (4)

120E.3.3.2.1 Host stressed input test procedure

<…> The stressed signal is generated by adding sinusoidal jitter, random jitter, and bounded uncorrelated jitter **to a clean pattern**. The frequency and peak-to-peak amplitude of the sinusoidal jitter used for the host stressed input test is given in Table 120E–6.

Bounded uncorrelated jitter provides a source of bounded high probability jitter uncorrelated with the signal stream. This jitter stress source may not be present in all stressed pattern generators or bit error ratio testers. <…>

- Change "the signal stream" to "the clean pattern".
- Apply also to the similar text in 120E.3.4.1.1.