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STANDARDIZATION SECTOR**

STUDY PERIOD 2017-2020

**SG15-LS73  
STUDY GROUP 15**

**Original: English**

**Question(s):** 6/15

Hangzhou, 16-19 October 2017

**Ref.: TD97/GEN**

**Source:** ITU-T Study Group 15

**Title:** Response to Liaison Statement from the IEEE 802.3

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**LIAISON STATEMENT**

**For action to:** -

**For comment to:** IEEE 802.3 Ethernet Working Group (Beyond 10 km Optical PHYs Study Group)

**For information to:** -

**Approval:** ITU-T SG15, Q6/15 (Hangzhou, 16-19 October 2017)

**Deadline:** 27 January 2018

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Q6/15 thanks IEEE 802.3 for their Liaison Statement, dated 13 July 2017, which we reviewed during the Q6 Interim Meeting in Hangzhou, China, 16 – 19 October 2017.

In your liaison statement you informed Q6 that the IEEE 802.3 Ethernet Working Group has formed a Study Group to consider the development of optical solutions targeting reaches beyond 10 km for 50 Gb/s, 200 Gb/s, and 400 Gb/s Ethernet. In your Liaison Statement you expressed your understanding that work is underway on a revision of the G.698.2 specification within ITU-T Study Group 15 to address 100 Gb/s coherent optical interfaces and furthermore, that if this understanding is correct, IEEE 802.3 would like to request a status update on the effort and any information that ITU-T SG15 might feel is relevant to share.

Q6 has an ongoing activity to revise Recommendation ITU-T G.698.2 to include multi-vendor interoperable 40 Gbit/s and 100 Gbit/s single channel optical interfaces. The current focus of this work in Q6 is to only add application codes for 100 Gbit/s to a revision of G.698.2 because of a reduced market need for multi-vendor interoperable 40 Gbit/s systems. Q6 is targeting consent of revised G.698.2 at the SG15 Plenary Meeting in October 2018.

The work in Q6 to complete this effort has proven to be quite complex because of the necessity to develop a completely new specification methodology specifically for phase modulated signals with multiple bits per symbol.

For the work on revising G.698.2 Q6 has been focussing first on solving the fundamental issues for specifying phase modulated signals. Q6 started this work investigating a methodology to ensure compatibility between the transmitted signal and the filter function of the optical path through the DWDM network. To address this area Q6 has developed a “maximum spectral excursion” parameter with demonstrated correlation with measured optical path penalties.

Q6 moved on to addressing the definition of a suitable parameter that specifies the quality of a coherent transmitter, for which currently  $EVM_{rms}$  (RMS of Error Vector Magnitude) was selected to be a suitable candidate to replace the traditional eye mask specification for NRZ modulated signals. A fundamental part of this study has been the gathering of sufficient test data to evaluate the draft definitions and associated test scripts in order to be able to develop parameter values that have a high correlation with parameters specifying actual system performance, like OSNR.

At the SG15 Plenary Meeting in Geneva, 19 – 30 June 2017, it was provisionally agreed to use  $EVM_{RMS}$  (RMS of Error Vector Magnitude), corrected for the effects of I-Q offset, and a separate limit for corrected I-Q offset as metrics for the quality of the transmitter. There was also agreement that the results from testing of I-Q imbalance and Quadrature Error were not sufficiently consistent to justify their removal from the  $EVM_{RMS}$  metric or the introduction of these parameters as additional metrics for the quality of the transmitter.

Q6 feels that these kind of investigations need to be based on measurement results of real devices instead of simulations.

At the interim meeting in Hangzhou, China, 16 – 19 October 2017, Q6 provisionally agreed that testing  $EVM_{RMS}$  would be done using a reference receiver containing a 7 tap T spaced equalizer.

As a further step Q6 is targeting the creation of a new work item at the SG15 Plenary Meeting in January/February 2018 to add 200 Gbit/s and 400 Gbit/s application codes in a future revision of G.698.2. A first step will be the definition of appropriate terms of reference for this new work item, including reach ranges, number of OADMs, number of wavelengths per aggregate 200G or 400G rate, total number of wavelengths in the application and candidate modulation formats (in relation to reach).

As Q6 progresses its work on the revision of Recommendation ITU-T G.698.2, we will be happy to continue to liaise with IEEE 802.3 about the progress made.

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