

Considerations on achieving optical multi-vendor interoperability for 400GBASE-ZR

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Introduction

For over 2 years the P802.3cw Task Force is engaged in attempting to establish suitable one or more quality metrics (and associated values) for the DP-16QAM 400G transmitter now, without making any relevant progress.

Similar discussions have ongoing for quite some time also in OIF's 400ZR project and ITU-T SG15/Q6 with a status similar to P802.3cw.

This presentation contains considerations on the achievability of optical multi-vendor interoperability for 400BASE-ZR.

Specifications supporting optical multi-vendor interoperability

- It is the authors understanding that for true Ethernet applications it's fundamental to develop specifications for optical PMDs which support optical multi-vendor interoperability.
- Without that element, applying to optical transmitter, link/channel and receiver, true plug-and-play deployment without additional (link or transceiver) engineering will not be possible.
- Despite this understanding P802.3cw is struggling to make sufficient progress towards establishing an appropriate metric for the quality for the DP-16QAM coherent 400 Gb/s transmitter.

Difficulties for progressing Tx quality metric for DP-16QAM

- The cw TF has been trying to progress the issue of identifying a suitable Tx quality metric for DP-16QAM already since 2019.
- In January 2020 a motion passed adopting a test plan to explore the suitability of EVM as a promising candidate, a test plan which was further improved over the past year.
- Other candidate Tx metrics have always been welcome.
- An alternative, Tx BER, has been suggested but so far no evidence has been provided that it would be either a suitable candidate or a better candidate than EVM.
- The last detailed test results were shown to the cw TF in 2019.
- It appears to be “complicated” to make the necessary data available to the cw TF.
- No sufficiently detailed proposals on other Tx Metrics have been submitted.
- In the meantime ITU-T SG15 decided at its last Plenary Meeting, December 2021, to stop an equivalent work item due to lack of progress.

Test data submitted to P802.3cw (and P802.3ct) TF

- *March 2019, Pete Anslow, [anslow_3ct_02_0319](#): “ EVM_{RMS} measurement update”*
- *July 2019, Fabio Pittalà, [pittala_3ct_01a_0719](#): “ EVM_{RMS} Measurements for DP-DQPSK and DP-16QAM Format”*

Both results (based upon an earlier version of the Keysight script) were insufficiently consistent to draw any conclusions and further results from testing were requested.

- *November 2020, Winston Way, et al, [way_3ct_01b_1119](#): “400GBASE-ZR EVM Pass/Fail Criteria”*
- *November 2021, Yang Fu, et al, [fu_3cw_01_211115](#): “ROSNR and EVM Correlation Study for 400G ZR Modules”*

Both sets of test data made available not carried out according agreed test plan and therefore not usable to define suitable Tx quality metric.

Why is this so “complicated”?

- Is the coherent DP-16QAM technology for 400 Gb/s not sufficiently mature?
- Is this technology maybe not yet commodity / plug-and-play ready?
- Or is it still leading edge with low operational optical performance margins?
- Is the needed optical technology sufficiently wide available?
- Or is the knowledge to design and manufacture the coherent transceivers not widely available?
- Or are the end-users in reality satisfied with currently available modules and using them book-ended?

Continue requesting test data on Tx quality metric?

It is the authors view that continuing with requesting test data on multiple implementations makes sense only if there is a realistic outlook that this data becomes available to P802.3cw in the foreseeable future

Discontinue the 802.3CW project?

It is the authors view that if there will be no outlook to progress the definition of a suitable quality metric for the 400G DP-16QAM transmitter within the foreseeable future, that we should consider to submit a request to the 802.3 WG to discontinue 802.3CW.

In order to assess the situation it would be recommendable to have a straw poll to identify the number of individuals who intend to submit the necessary data within the foreseeable future.

Thanks!