May 19, 2019

To: David Law and members of the IEEE 802.3 Working Group
cc: Peter Anslow, IEEE 802.3 WG Secretary
John D'Ambrosia – IEEE P802.3ct Task Force

Subject: 400ZR Interop Project

From: Klaus-Holger Otto, OIF Technical Committee Chair (klaus-holger.otto@nokia.com)

Dear Mr. Law and participants of IEEE 802.3 Working Group,

We thank the IEEE for the 11th March 2019 Liaison response to the OIF liaison "400ZR Interop Project".

The OIF Q2 Technical and MA&E Committees meetings were held in Dubrovnik, Croatia from May 14th through May 16th.

This Implementation Agreement (IA) specifies a Digital Coherent 400ZR interface for two applications:

- 120 km or less, amplified, point-to-point, DWDM noise limited links.
- Unamplified, single wavelength, loss limited links.

This meeting's focus was on straw ballot comment resolution. In Q1'19 we adopted the "black link" approach to specifying the optical media transfer function. A fair amount of comments and discussion in this Q2'19 meeting, resulted in harmonizing this approach with the prior TX and RX centric view.

We very much appreciate that you are able to leverage the work done in the OIF on 400ZR for the IEEE P802.3ct 400GBASE-ZR. It is our hope that the resulting effort will prove to have significant common ground. To that goal you requested additional information on the following topics:

- It was noted that an Editor's note was included in the Introduction of IA # OIF400ZR-0.10 Draft, which stated that "Additional contributions are required to define optical interoperability" and noted 1) EVM and related optical parameters, and 2) Reference transfer characteristics for the black link. In OIF-400ZR 0.11 Draft this note has been removed. We would appreciate if you could call to our attention the improvements that have been made in this version of the draft to facilitate optical interoperability.
- A discrepancy between Table 13.1.1 and Annex A has been noted, where in Table 13.1.1 the minimum channel frequency is noted as 191.3 THz, but called out as 191.4 THz in Annex A.
- We would appreciate clarification of the parameter "Optical input power transient tolerance" specified in 13.1.353. What does it mean and how was the value determined?

Please see the following response to your questions:

"We would appreciate if you could call to our attention the improvements that have been made in this version of the draft to facilitate optical interoperability":

- At this time the OIF believes the most expeditious path to protocol and optical interoperability will be achieved by complying with all required aspects of the 400ZR IA. Digital datapath verification is guaranteed through a combination of interoperability test vectors and the use of common sets of test generators and checkers required by hardware. The generators and checkers can be configured using looped back pairs for self-testing or in a cross-linked configurations. Optical interworking is achieved through strict adherence to the discrete Tx/Rx optical parameter specifications and operating over a compliant channel "black link".
- We are also moving forward with Error Vector Magnitude Testing and specifications. These are currently documented in an informative appendix, however, it is felt that the verification of the test algorithms and pass criteria will require actual silicon to complete. EVM specifications are intended for future integration to the normative sections of this IA.

Regarding the noted discrepancy in Table 13.1.1 and Annex A (Now Section 17: Operating frequency channel definitions).

- The 400ZR does not require that a compliant solution is required to be tunable (over the whole range or partial subset of the range). The ability to tune and over what range is left to the vendor to define. The 400ZR IA, however, does include a normative channel plan and associated center frequency definitions for those applications that have the ability to tune, and to facilitate interoperability over the defined channels. The optical specifications are expected to be compliant over the capable range defined by the vendors. Table 13.1.1 defines the range of frequencies over which the optical specification would apply. The 400ZR has an optional 75 Ghz channel plan which would make the lowest channel frequency 191.375 GHz. Rounding down from this is 191.3 GHz for the optional 75 GHz grid. 191.4 GHz is the lowest channel number for 100 GHz channel spacing.

Clarification of the parameter "Optical input power transient tolerance" specified in 13.1.353. What does it mean and how was the value determined?

- Optical power transients are common occurrences in a network (e.g. resulting from re-provisioning of an optical amplifier within the network, or from protection switching). This parameter attempts to quantize the expected OSNR penalty resulting for a given transient condition. The Optical power transient specification is limited only by the specified input operating range of the receiver (actual transients may cause additional penalty). This parameter also provides guidance on receiver implementations (e.g. TIA BW). This parameter, does not attempt to limit or bound a network configuration, but it does attempt to quantify a receiver's ability to respond to such a transient, The OIF is open to contributions from network operators or other standards organizations who may have experience in this area. This would help to precisely define the transient conditions and the expected behavior of a 400ZR receiver.

We very much appreciate our ability to liaise with the IEEE P802.3ct Task Force on the 400ZR applications. Please keep us updated on any decisions or directions in the 400GBASE-ZR project that would indicate synergistic or divergence from the 400ZR IA. We would also appreciate any comments and feedback you may have on the attached 400ZR IA working document (oif2019.161.03). We will continue to update the IEEE 802.3 on the progress of the 400ZR IA. Our next meeting is in Montreal Canada the week of July 29th, 2019.

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Sincerely,

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