Terminology

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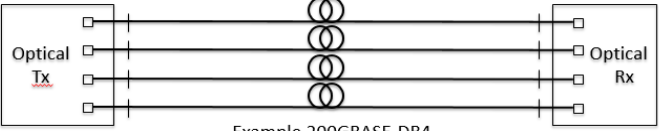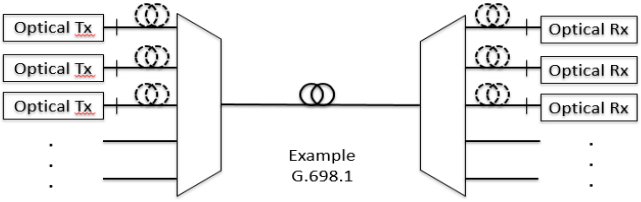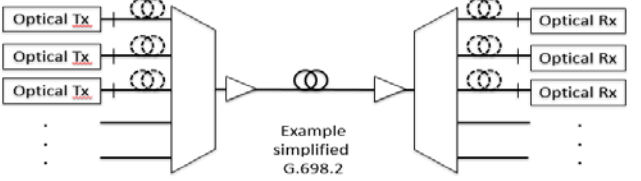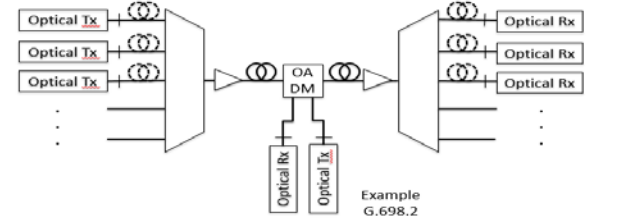
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Introduction

- At Sept SG Meeting – the following objectives were proposed (http://www.ieee802.org/3/B10K/public/17_09/villarruel_b10k_01b_0917.pdf)
  - 200 Gb/s 40-80km interface with appropriate support for DWDM systems
  - 100 Gb/s 40-80km interface with appropriate support for DWDM systems

- Jan 2018 Terminology Ad Hoc Chartered
  - Provide definitions for terminology identified by SG on Page 6 of http://www.ieee802.org/3/B10K/public/18_01/dambrosia_b10k_01a_0118.pdf to facilitate clear understanding of terms as related to potential optical objectives of the Study Group, with particular emphasis on terminology related to optical / DWDM technologies.

- anslow_b10k_01_0118 proposed standardized optical link types

- This presentation proposes some definitions for the identified terms

Terms (dambrosia_b10k_01a_0118, p. 6)

1. Lane
2. Signal
3. Lambda
4. PHY
5. Link
6. Channel
7. Point-to-point link
8. WDM
9. DWDM
10. DWDM Link
11. DWDM Systems
12. DWDM Network
13. In-line amplification

Type	Optical Link Types	IEEE 802.3	ITU-T SG15
1	Type 1: Optical Tx — fiber — Optical Rx. Example 10GBASE-LR	✓	✓
2	Type 2: Optical Tx — four fibers — Optical Rx. Example 200GBASE-DR4	✓	
3	Type 3: Optical Tx — mux/fiber/demux — Optical Rx. Example 100GBASE-ER4	✓	✓
4	Type 4: Optical Tx — mux/fiber/demux — Optical Rx. Example G.698.1		✓
5	Type 5: Optical Tx — mux/amp/fiber/amp/demux — Optical Rx. Example simplified G.698.2		✓
6	Type 6: Optical Tx — mux/amp/OADM/amp/demux — Optical Rx. Example G.698.2		✓

Source: Pete Anslow, https://www.itu.int/en/ITU-T/Workshops-and-Seminars/20180127/Documents/Session%201%20-%20All%20presentations.pdf

1. Lane - Proposed Updated Definition per http://www.ieee802.org/3/cj/comments/P8023-D3p0-Comments-Final-byID.pdf

   - "A logical subset of the data and control information transmitted from one sublayer (e.g., PCS, PMA) to an adjacent sublayer across the inter-sublayer interface or from one PHY to another across the transmission medium (e.g. optical fiber, optical wavelength, wire pair). Lanes are transmitted in parallel and combine to deliver the full set of data and control information across the interface."

2. Signal - An impulse or fluctuating quantity, as of electrical voltage or light intensity, whose variations represent coded information. (http://www.thefreedictionary.com/signal)

3. Lambda - indicates the wavelength in a wavelength-division multiplexing optical communications system. (https://en.wikipedia.org/wiki/Lambda)

4. PHY (1.4.372) - **Physical Layer entity (PHY):** Within IEEE 802.3, the portion of the Physical Layer between the Medium Dependent Interface (MDI) and the Media Independent Interface (MII), Gigabit Media Indepen-dent Interface (GMII) or 10 Gigabit Media Independent Interface (XGMII), consisting of the Physical Cod-ing Sublayer (PCS), the Physical Medium Attachment (PMA), and, if present, the WAN Interface Sublayer (WIS) and Physical Medium Dependent (PMD) sublayers. The PHY contains the functions that transmit, receive, and manage the encoded signals that are impressed on and recovered from the physical medium. (For example, See IEEE Std 802.3, Clauses 23 to 26, Clause 32, Clause 36, Clause 40, Clauses 48 to 54, Clauses 58 to 63, Clause 65, Clause 66, Clauses 82 to 89, and Clause 96.)

5. Link - One PHY transmitting to another PHY through a transmission path between them

6. Channel – The transmission path between a PHY transmitting to another PHY

7. Point-to-point link - a communications medium with exactly two endpoints and no data or packet formatting. (https://en.wikipedia.org/wiki/Point-to-point_(telecommunications). Optical Link Types 1, 2, and 3.

8. WDM – optical technology that couples many wavelengths in the same fiber, thus effectively increasing the aggregate bandwidth per fiber to the sum of the bit rates of each wavelength. *
    - IEEE 802.3 has defined various optical "WDM" PHYs, e.g. based on multiple optical wavelengths. Sample definition - 1.4.72l 400GBASE-LR8: IEEE 802.3 Physical Layer specification for 400 Gb/s using 400GBASE-R encoding and 4-level pulse amplitude modulation <u>over eight WDM lanes</u> on single-mode fiber, with reach up to at least 10 km. (See IEEE Std 802.3, Clause 122.) (See Optical Link #3)
9. DWDM – In fiber-optic communications, wavelength-division multiplexing (WDM) is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e., colors) of laser light. This technique enables bidirectional communications over one strand of fiber, as well as multiplication of capacity. (Source: Wikipedia)
    - IEEE 802.3 Normative Reference: ITU-T Recommendation G.694.1—Spectral grids for WDM applications: DWDM frequency grid.
    - Based on villarruel_b10k_01b_0917, it is assumed each wavelength would correspond to a " DWDM link"
10. DWDM Link - One PHY transmitting to another PHY through [assumed] single optical wavelength on the G.694.1 DWDM frequency grid in the presence of multiple DWDM links on a single fiber. (See Optical Link Types #4, 5, and 6.)
11. DWDM Systems –A basic DWDM system will have an optical mux / demux for the multiplexing of multiple DWDM links onto a fiber (See Optical Link Type #4), and may include amplification (See Optical Link Types #5 and 6), and an optical add-drop multiplexer (See Optical Link Type #6).
12. DWDM Network - same as DWDM System?
13. In-line amplification –Optical amplification resides between the demarcation points, e.g. within the channel. See Optical Link Types #5 and 6.

Source: Kartalaopoulos, Introduction to DWDM Technology.