IEEE P802.3ct Terminology (Part II) Ad hoc Teleconference Meeting

Definitions Update

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IEEE P802.3ct Terminology (Part II) Ad hoc, 12 February 202

Background

- Several comments were submitted against P802.3ct D3.1 related to terminology, specifically around DWDM and DWDM Systems (see backup slides)
- As a result of discussions during two recent teleconference meetings (28 January 2021 and 4 February 2021), understanding around the terminology appears to have improved significantly
- This presentation contains the author's understanding of the status of the current discussions, additional proposals to address some of the open issues, and identifies areas that need further discussion and consensus building
- Reference Presentations
  - stassar_3ct_01_210128, dambrosia_3ct_01c_210128
  - dambrosia_3ct_01_210204, stassar_3ct_01_210204

Introduction

- It is the observation of the author's that there appears to be general consensus around the following terms and associated definitions:
  - DWDM PHY
  - DWDM Channel
  - DWDM System
  - Black Link Approach
- Further discussions and consensus building is needed on:
  - The "Grey Box"

DWDM PHY

- Current definition is acceptable
  - **DWDM PHY:** An Ethernet PHY that is capable of running over one DWDM channel in each direction of transmission.

No need for modification

DWDM Channel

- Current Definition –
  - **DWDM channel:** The transmission path between a DWDM PHY transmitting to another DWDM PHY.
- Proposed Update (stassar_3ct_01_210204) –
  - **DWDM channel:** The transmission path between a transmitting DWDM PHY (TP2) to a receiving DWDM PHY (TP3)

Accept modified definition

DWDM System

- Based on discussions during the during the interim teleconference meeting on 4 February 2021, there appears to be consensus to delete this term
- Proposal:
  - Delete the definition for "DWDM System“
- Question:
  - Should the IEEE P802.3ct specification title be changed from “….100 Gb/s Operation over DWDM Systems” to “100 Gb/s Operation over DWDM Channels”

Accept proposal

Black Link Approach

- There appears to be consensus to change “Black Link” to “Black Link Approach” with a definition based along the lines suggested on slide 6 of stassar_3ct_01_210204
  - **Black Link Approach:** The specification of the input, output, and transfer characteristics of the uni-directional transmission path between TP2 to TP3 for a given DWDM channel within a DWDM Link, without specifying how the transmission path is implemented. (See, for example, IEEE Std 802.3, Clause 154, Figure 154–3)

Accept modified definition

DWDM Link

- Issues with current definition per P802.3ct D3.1
  - The current definition of DWDM link does not appear to agree with (or be well aligned to) the general usage in G.698.1/.2
  - DWDM link could also be viewed as a more generic term
    - The links in 100GBASE-LR4, 200GBASE-LR4, 400GBASE-FR8 and 400GBASE-LR8 can be called DWDM links, because the various channels are on an 800 GHz grid, and therefore by definition on a DWDM grid
- Proposal:
  - Delete the term DWDM link and associated definition

Accept proposal

The “Grey Box” ?

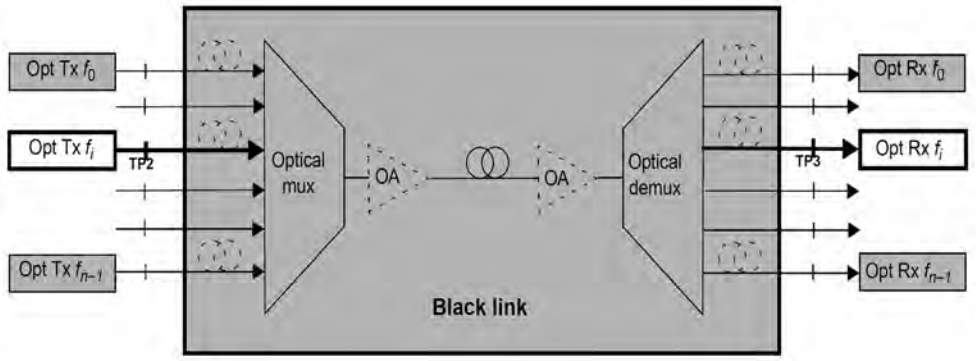


Figure 154–3—Black link example configuration for specifying *n* DWDM channels

Ref: P802.3ct D3.1

- D3.1 denotes this as “Black link”
- Proposed to change “Black link” to “Black link approach”
- Current suggestions for renaming the “grey box”:
  - DWDM link (dambrosia_3ct_01_210204)
  - DWDM black link (stassar_3ct_01_210204)

Proposal:

1) Change name of “grey box” from “Black link” to “DWDM black link”
2) Define “DWDM black link” as “**DWDM black link:** An aggregate of DWDM channels over either a single optical fiber or a single optical fiber per direction”

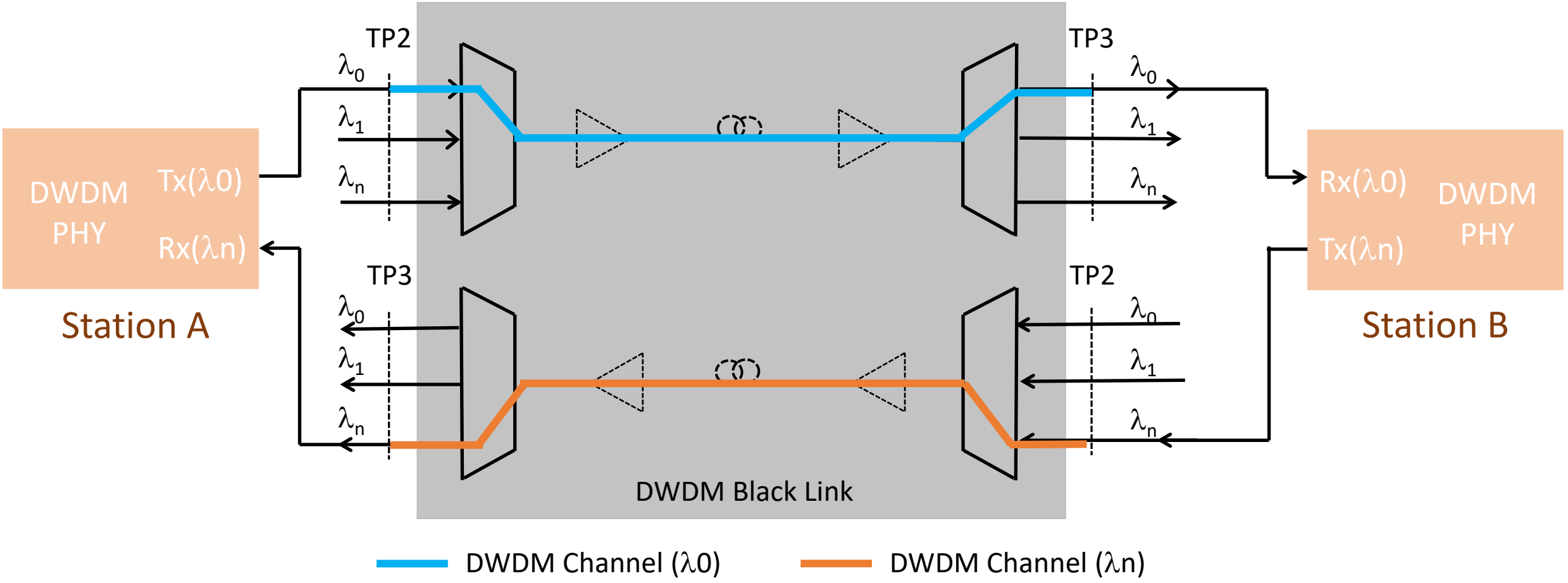
Open questions on “DWDM black link”

- Is it necessary to define or show that the DWDM Black Link is uni-directional (one fiber for each direction or transmission), or bi-directional (one fiber for both directions of transmission) at the physical level ?
  - Probably not, because by definition the link is black and therefore the internals are not specified
  - But it would be useful to have some typical implementation examples of a DWDM Black Link shown in an informative annex (e.g. 83C, 85A, etc)
- Is it necessary to show that the DWDM Blank Link is bi-directional at the black box level, i.e. has nxTP2 inputs on the left side and nxTP2 inputs on the right side ?
- Do we need to say anything about the number of DWDM channels (i.e. TP2 and TP3 ports) that a DWDM Black Link supports (as this may be different depending on whether the internal implementation is based on one fiber or two fibers ?

Relationship to Ethernet Full Duplex Operation

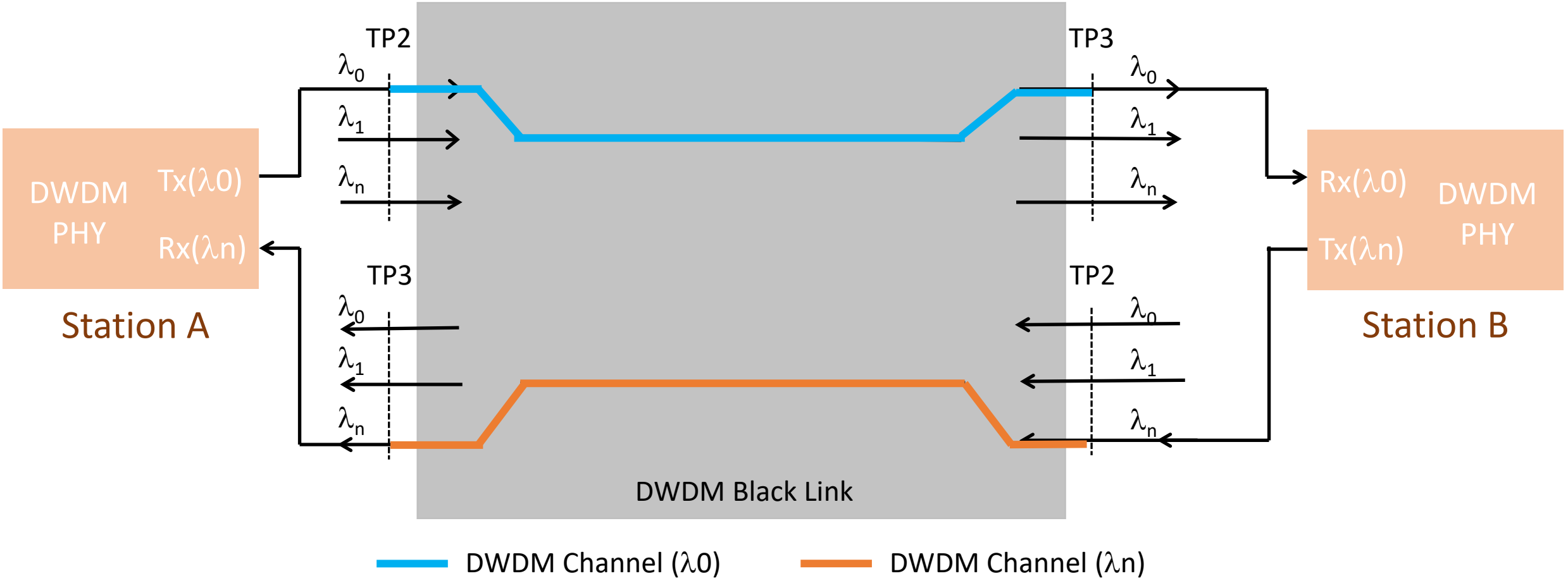
- Two DWDM channels, one in each direction, are required for full duplex ethernet operation.
- A DWDM channel operates at one channel center frequency
- The DWDM PHY transmitting (TP2) and the DWDM PHY receiving (TP3) need to operate at the same channel center frequency as the DWDM channel connecting them
- DWDM Channels may be carried over one or two fibers.

Relationship between DWDM PHY, DWDM Channel, DWDM Black Link and Full Duplex Ethernet



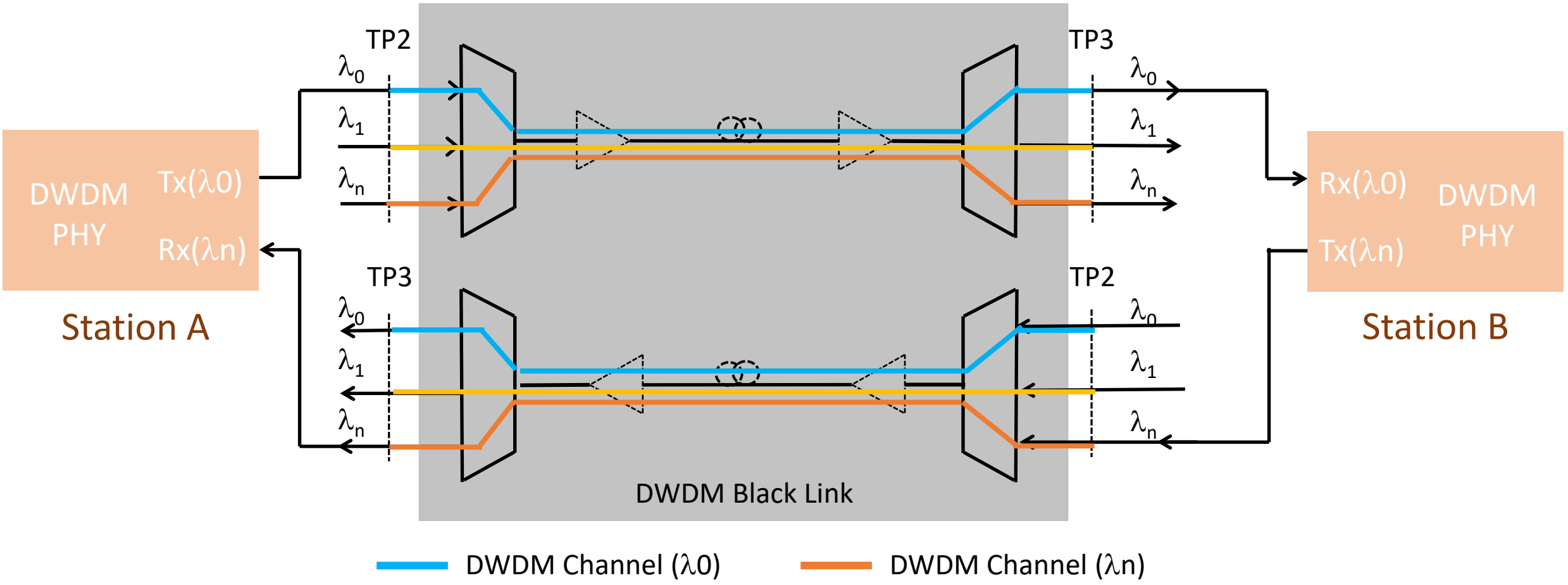
Relationship between DWDM PHY, DWDM Channel, DWDM Black Link and Full Duplex Ethernet

But it is really this !!



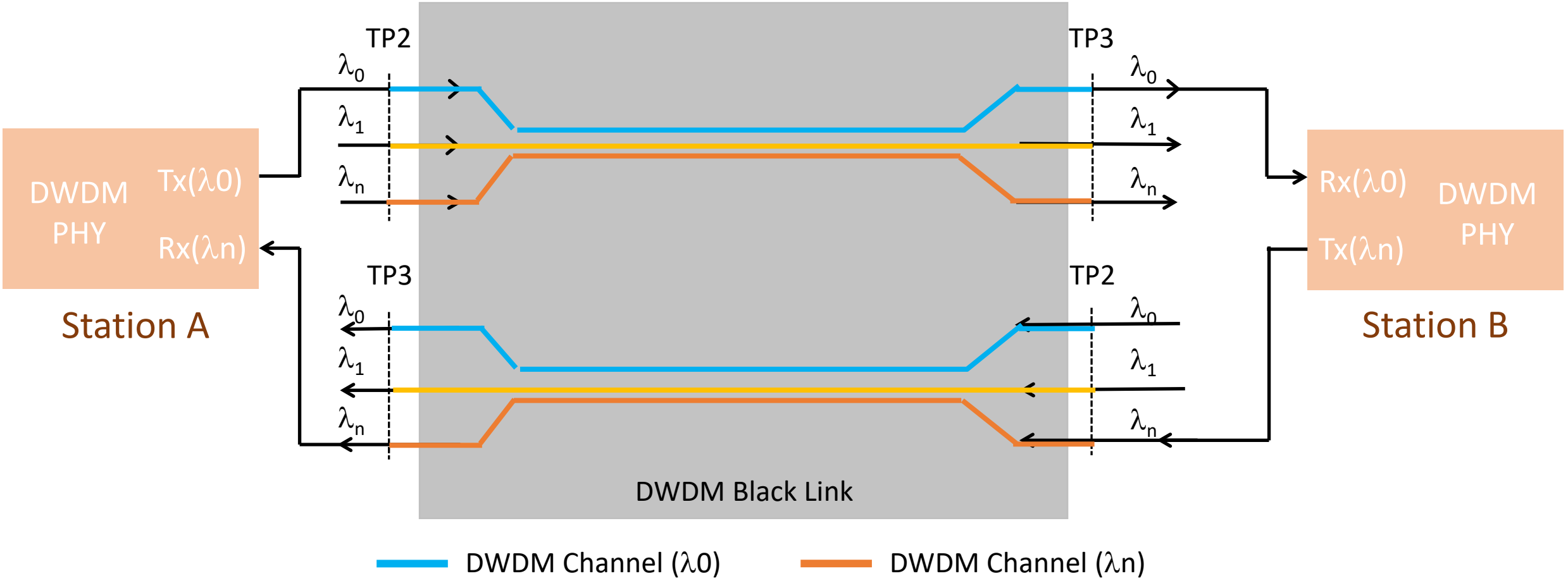
Backup

Relationship between DWDM PHY, DWDM Channel, DWDM Black Link and Full Duplex Ethernet



Relationship between DWDM PHY, DWDM Channel, DWDM Black Link and Full Duplex Ethernet

But it is really this !!

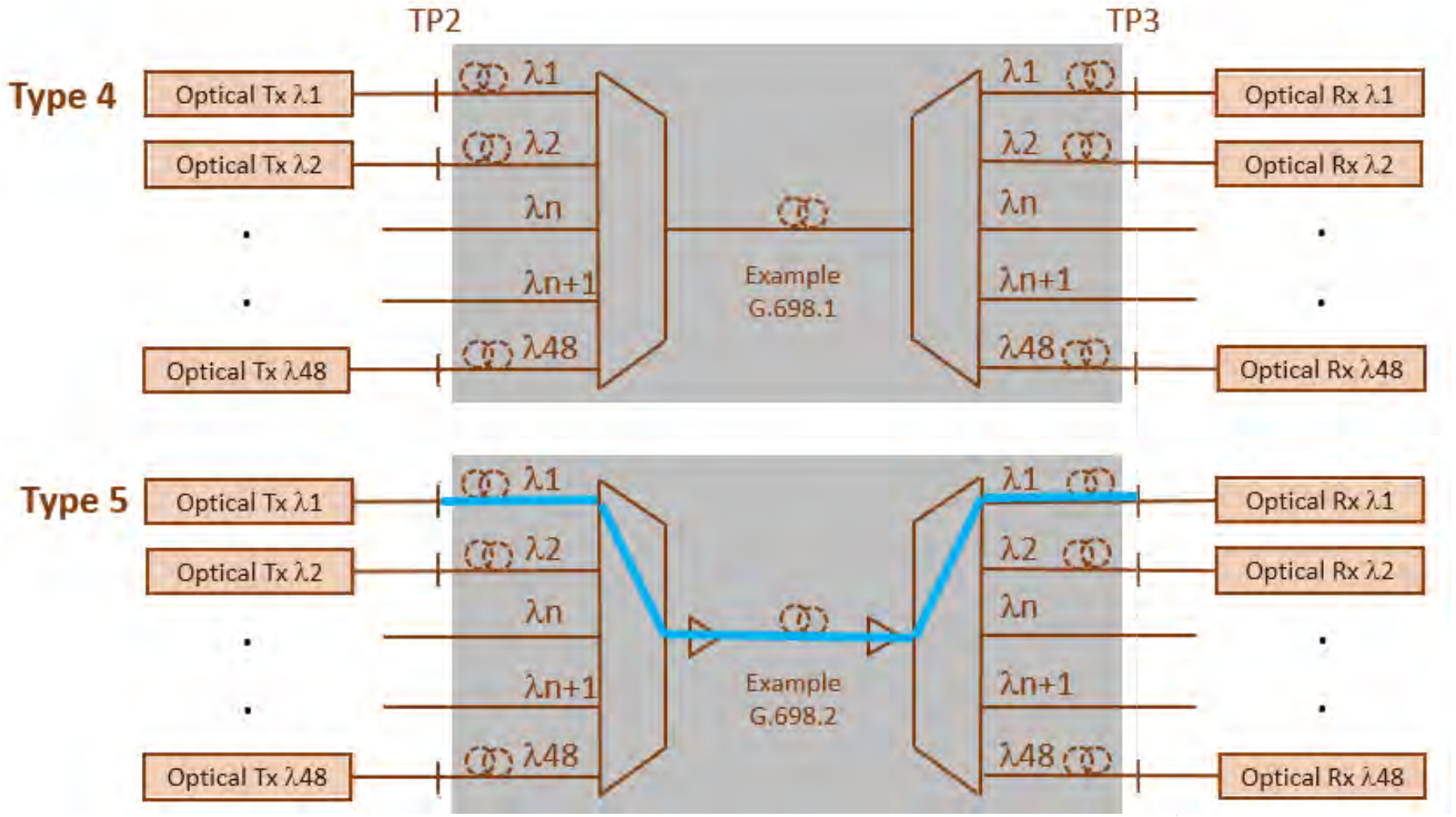


Proposed IEEE P802.3ct Terminology Update

DWDM PHY:

DWDM Channel:

DWDM Black Link



For clarity, only one direction of transmission is shown

Comment Summary (other comments may need to be considered

ID	Comment	Proposed Remedy
R1-9	"DWDM System" is an unnecessary term	Delete the definition for "DWDM System". Related changes covered in other comments.
R1-48	The definition of DWDM Link should not include the DWDM PHYs to align with ITU-T use of the term DWDM Link.	Change definition of DWDM Link to DWDM Link – an aggregate of DWDM channels over either a single optical fiber or a single optical fiber per direction This effectively changes the naming of the "gray box" , ie everything between TP2 and TP3 for all channels, from Black link to DWDM link - therefore all instances of the term Black link used to describe everything between TP2 and TP3 (and not the Black Link methodology) should be replaced with term DWDM link.
R1-50	The term Black Link is used to represent the aggregate of DWDM Channels, as well as the methodology to describe the input, output, and transfer characteristics of the uni-directional transmission path between TP2 to TP3 for a given DWDM channel are specified, without specifying how the transmission path is implemented. It is felt that this will cause future readers confusion	Modify term Black Link to Black Link Methodology to focus on the specification methodology, and change definition to - the specification of the input, output, and transfer characteristics of the uni-directional transmission path between TP2 to TP3 for a given DWDM channel within a DWDM Link, without specifying how the transmission path is implemented. (See, for example, IEEE Std 802.3, Clause 154, Figure 154–3)
R1-53	This statement is problematic - Because in this application DWDM technology is used to transport multiple DWDM channels over a single fiber..... While it is true that multiple DWDM channels may happen over a single fiber - 100 Gb/s Ethernet is full duplex - so a 100GBASE-ZR PHY will utilize two DWDM channels, and these two channels may exist on either one fiber or two fibers.	Proposed revision DWDM technology allows the transport of multiple DWDM channels over a single fiber. For communication between two 100GBASE-ZR PHYs two channels will be required - one channel in each direction of transmission. These two channels may reside on a single optical fiber or a single fiber per direction. A black link methodology is used to allow specificaiton..... Add two figures showing single direction or bidirection support as noted in next comment
R1-54	Fig 154--4 is labeled as an example configuration of the black link approach - which according to the draft is not intended to place any constraints on the implementation inside. Therefore, the best way to not place any constraints on the contents would be to not show anything within the box.	Delete all content within the gray box area of Fig 154-4. Change the blox to solid black. Label inside the box "DWDM Link" in white font. Furthermore, it would be helpful if one diagram illustrated all signals going in one direction as shown, but then showing a second figure with Tx / Rx on both sides of the DWDM link. The current Fig 154-4 is best used as an example of the types of DWDM links supported, and could be moved to the information annex 154A.

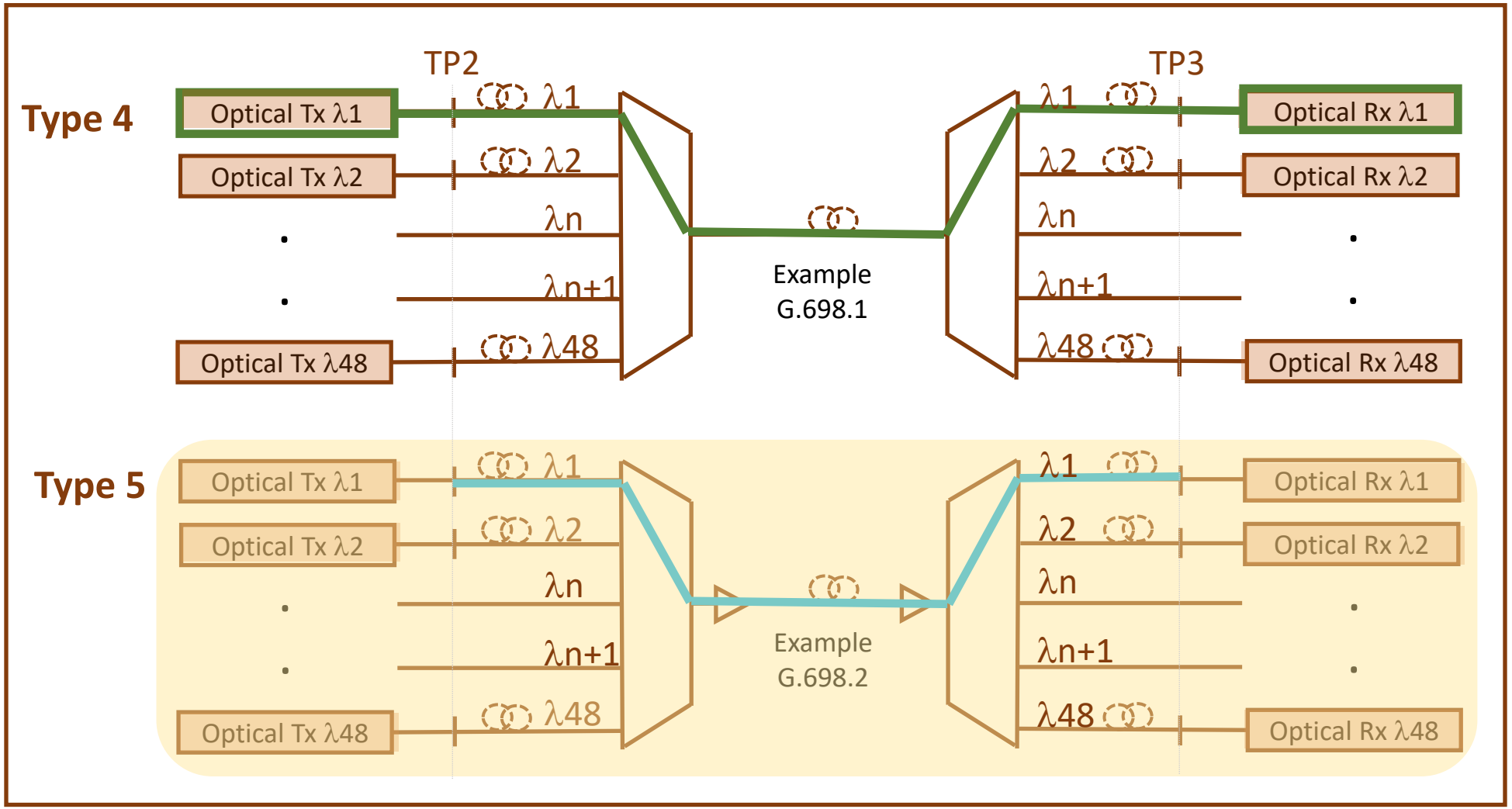
IEEE P802.3ct D3.1 Terminology Review

DWDM PHY:

DWDM Channel:

DWDM Link:

DWDM System:



Source: dambrosia_3ct_01_0719

IEEE P802.3ct D3.1 Terminology Review

- **1.4.237c DWDM PHY**: An Ethernet PHY that is capable of running over one DWDM channel in each direction of transmission.
- **1.4.237a DWDM channel**: The transmission path between a DWDM PHY transmitting to another DWDM PHY.
- **1.4.237b DWDM link**: One DWDM PHY transmitting to one other DWDM PHY through the transmission path between them.
- **1.4.237d DWDM system**: An aggregate of DWDM links optically multiplexed and demultiplexed onto and off either a single optical fiber or a single optical fiber per direction.
- **1.4.160a black link**: A multi-channel link specified using a methodology where the input, output, and transfer characteristics of the uni-directional transmission path between TP2 to TP3 for a given DWDM channel are specified, without specifying how the transmission path is implemented. (See, for example, IEEE Std 802.3, Clause 154, Figure 154–3)