

Coexistence between 10GEPON and 1GEPON

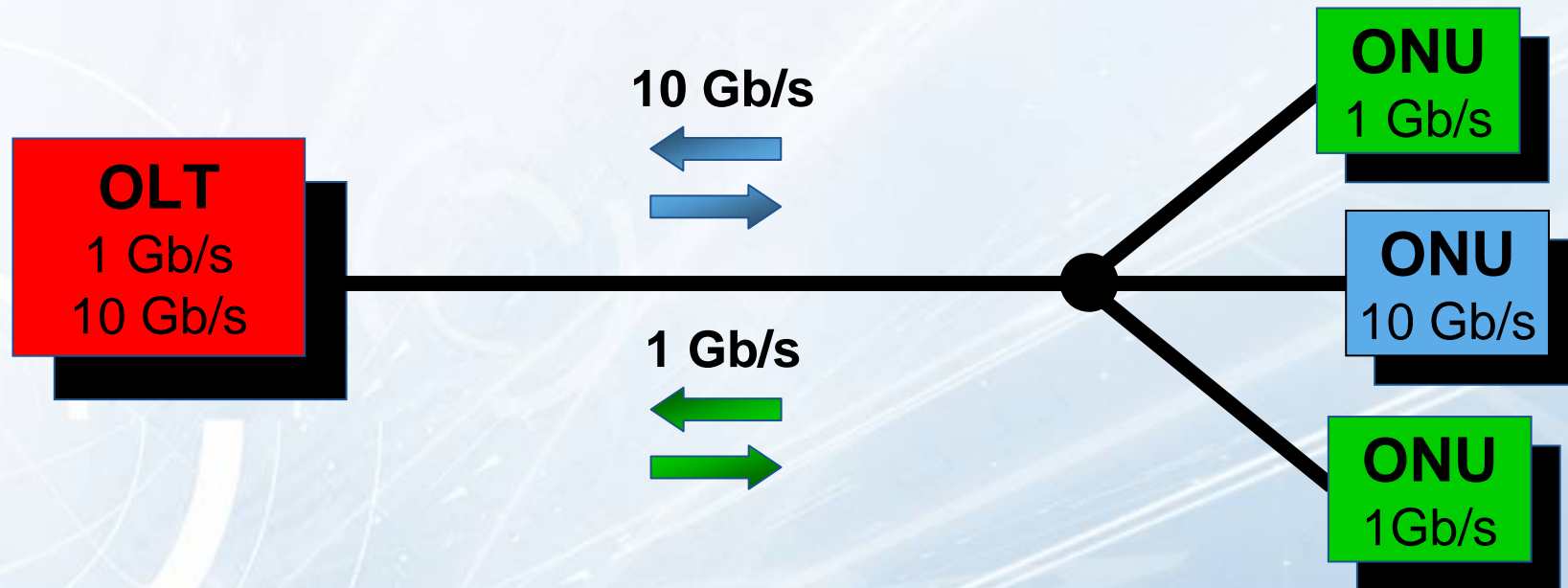
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Coexistence issues: 10GEPON and 1GEPON [1]

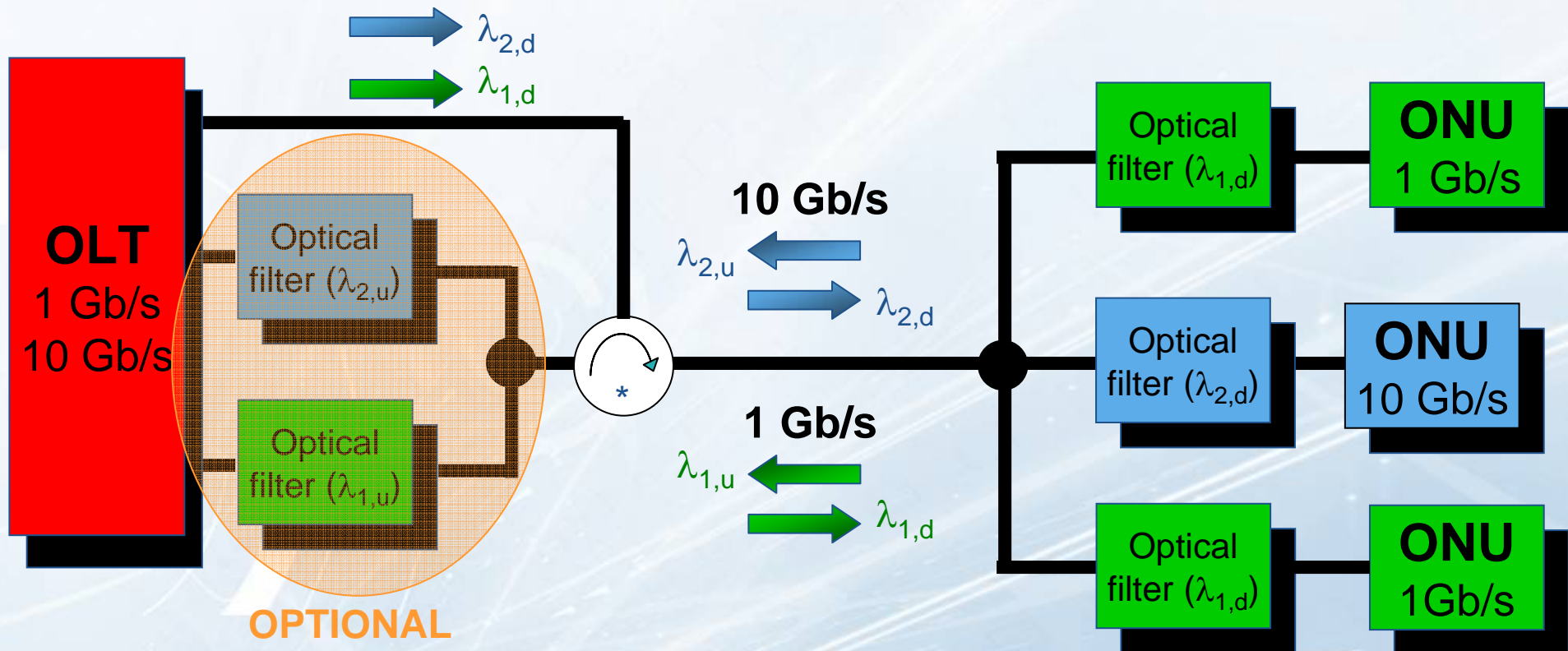
Problem: how to implement an EPON system with both 1Gb/s and 10Gb/s signals?



How can one guarantee no interference between the 1 Gb/s and 10 Gb/s signals?

Coexistence issues: 10GEPON and 1GEPON [2]

1st solution: Use of different wavelength band for each bit rate



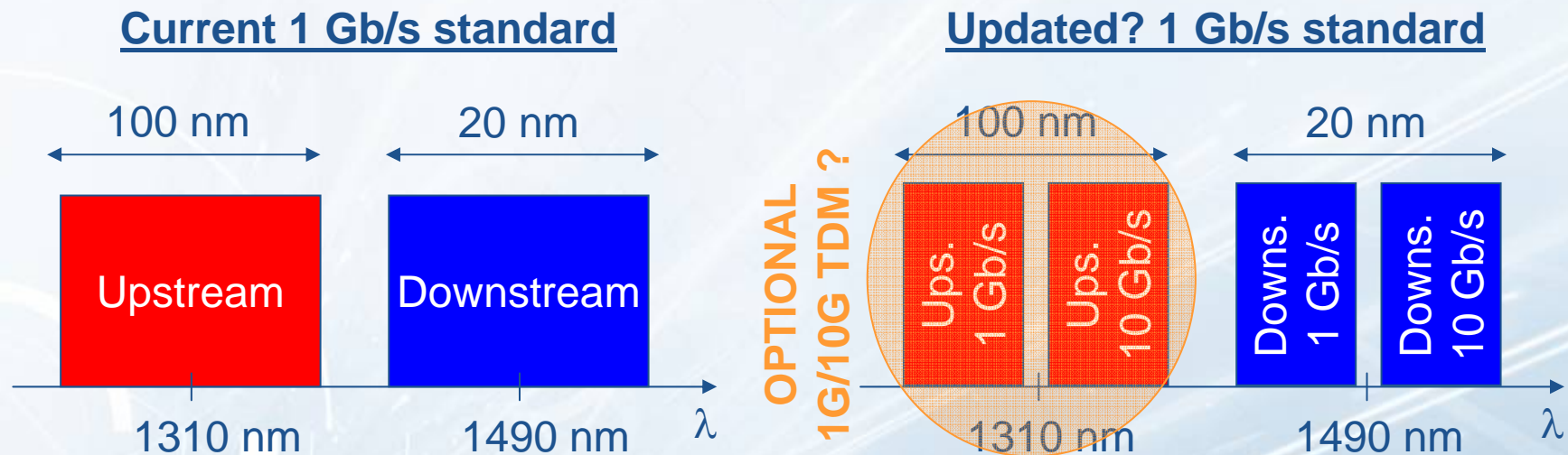
Advantages:

- negligible degradation due to the presence of 2 optical signals;
- mature technology;
- simple to implement.

* Optical filters can be used optionally

Coexistence issues: 10GEPON and 1GEPON [3]

1st solution: Limitations

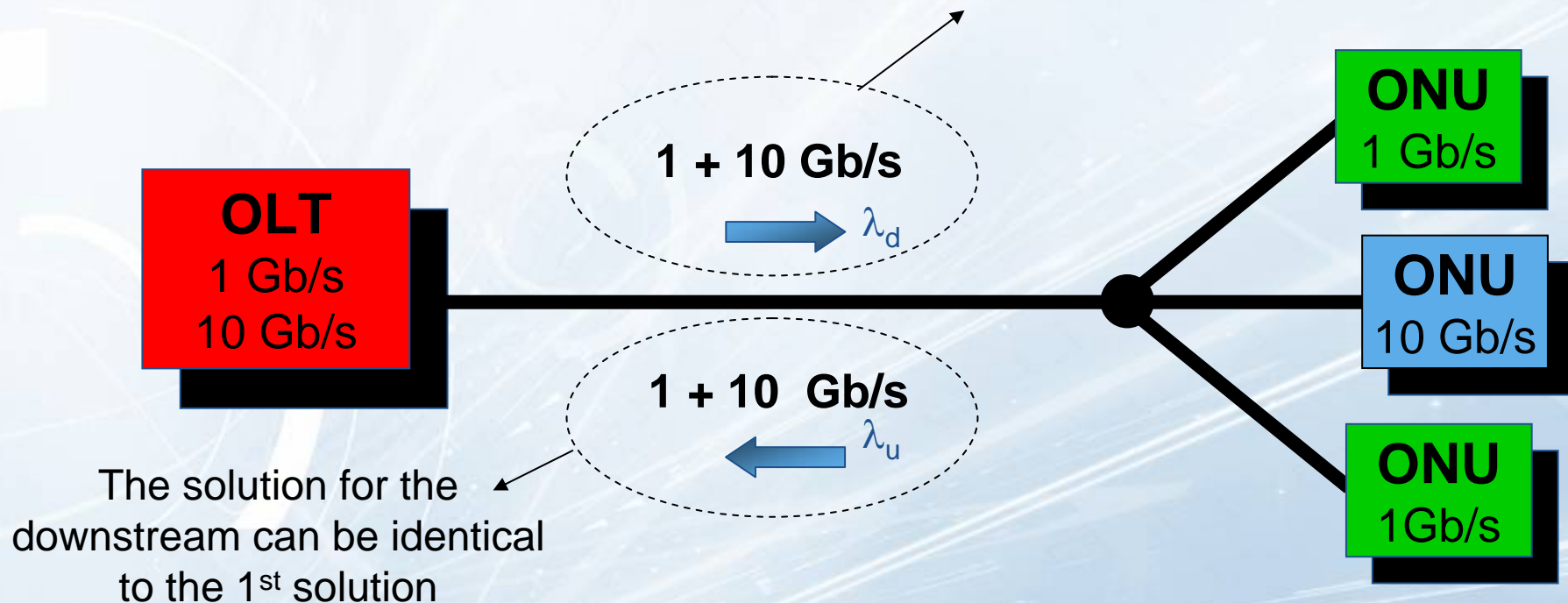


Additionally, one has to consider the introduction of the optical filters, **EVEN IN THE 1 Gb/s ONUs ALREADY INSTALLED IN THE FIELD!!!!!!**

Coexistence issues: 10GEPON and 1GEPON [4]

2nd solution: Use of orthogonal modulation formats

The same wavelength is used for both 1 Gb/s and 10 Gb/s

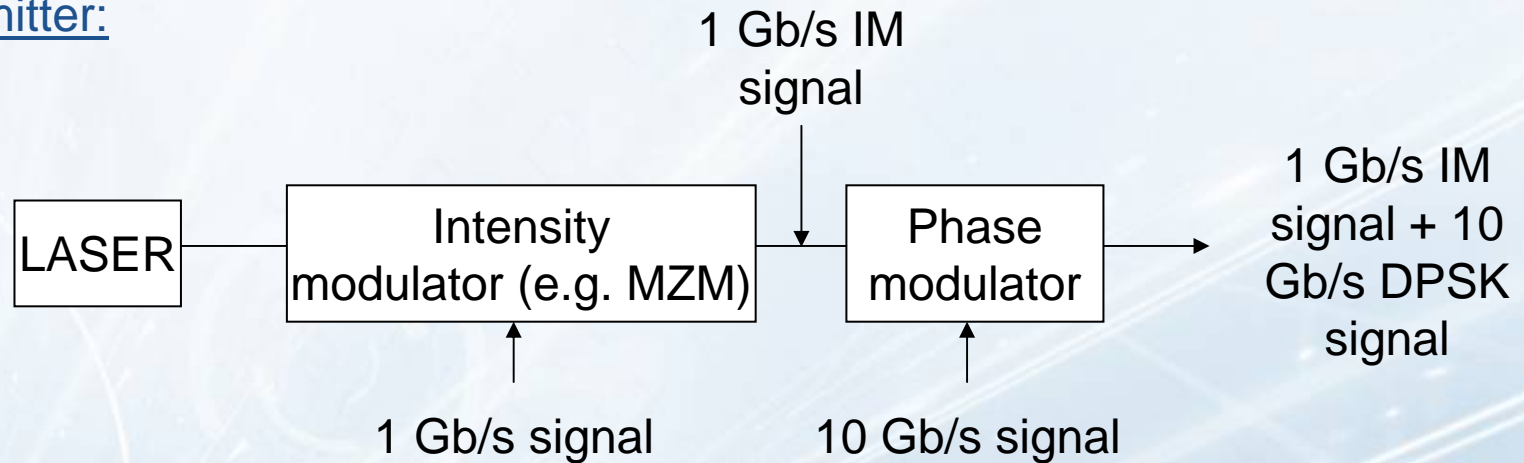


Advantages: - no change in the optical path of the already installed 1 Gb systems

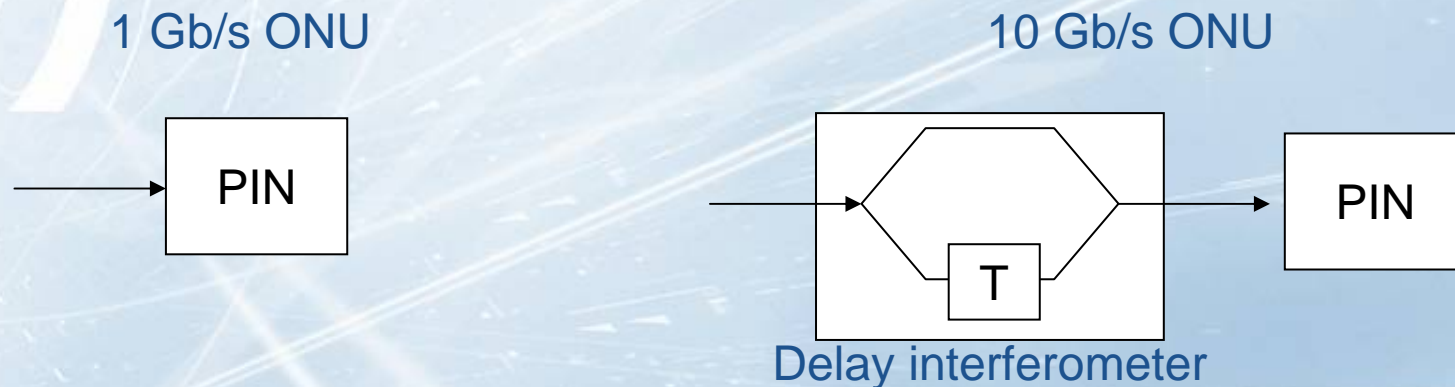
Coexistence issues: 10GEPON and 1GEPON [5]

2nd solution: Implementation (example of an IM + DPSK solution)

OLT transmitter:



ONU receiver:



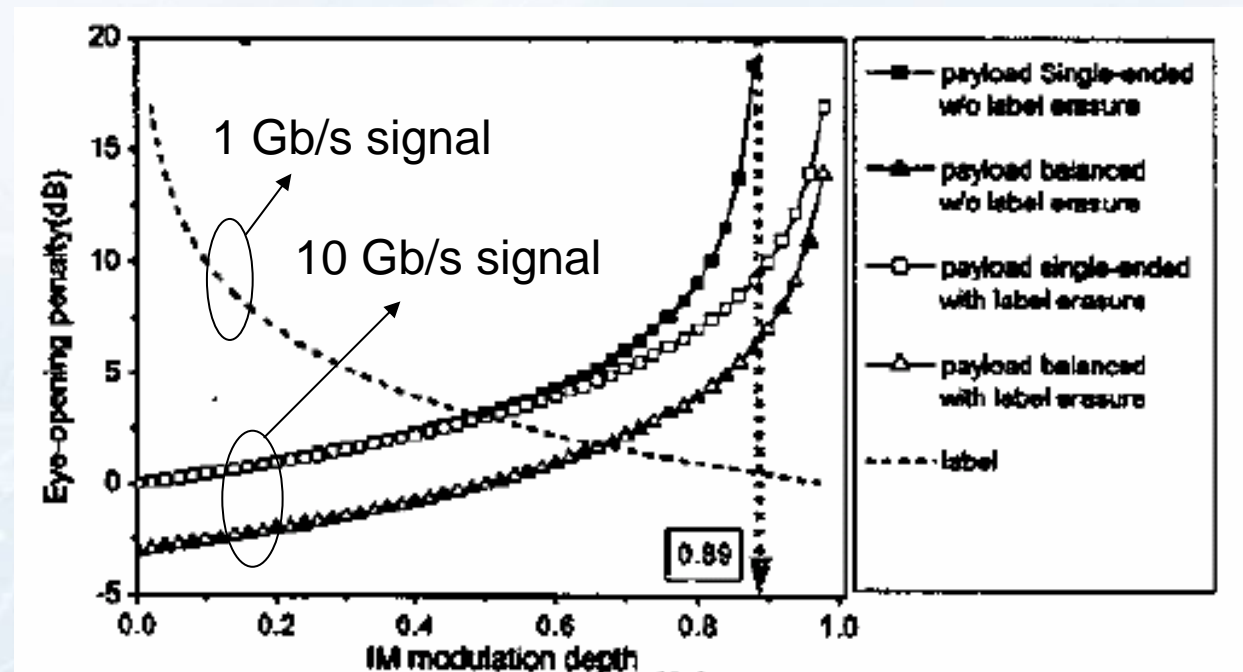
Coexistence issues: 10GEPON and 1GEPON [6]

2nd solution: Limitations

For the DPSK signal to be detected, the extinction ratio of the IM signal must be low



Degradation of the 1 Gb/s EPON performance in the downstream!!!!



Results presented in: N. Chi, et. al., "Orthogonal optical label based on a 40 Gb/s DPSK payload and a 2.5 Gb/s IM label", OFC 2004, USA.

Coexistence issues: 10GEPON and 1GEPON [7]

❖ Two different solutions to implement a 10 GEPON in a 1GEPON have been presented:

- Based on optical filters:

- + simple to implement
- + mature technology
- + negligible degradation
- changes in optical path
- changes in the 1GEPON standard

- Based on orthogonal modulations:

- + no change in the optical paths or 1GEPON ONUs;
- complex transmitter implementation;
- degradation of the optical signals for 1 G systems.