POLITECNICO DI TORINO

OPEN OPTICAL NETWORK LABORATORY

THE LINE SYSTEM

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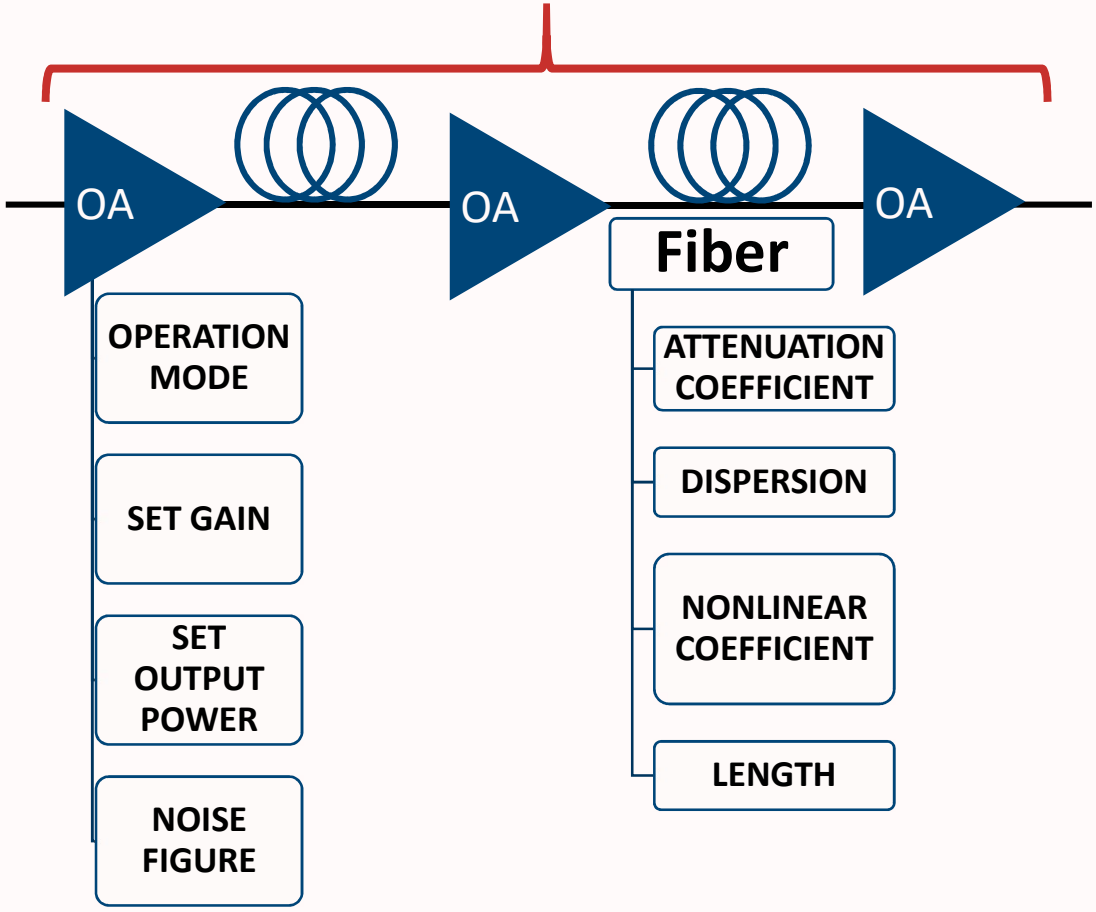
LINE SYSTEM

- A Line System is defined as a sequence of Fibers and Optical Amplifiers



AMPLIFIER'S WORKING MODE

Based on the power control plan, the amplifiers can be set to operate in two modes:

- **Fixed gain**

  The amplifier's gain G is set and immutable regardless of the signal at the input

- **Fixed output power**

  The amplifier tunes its gain G in order to deliver a certain output power. Thus, in this case:

$$G = P_{OUT,dBm} - P_{IN,dBm}$$

POWER CONTROL

- In the line system abstraction we define a POWER CONTROL PLANE which sets the working point of the amplifiers

- Different strategies can be set for the power control, for example:

  - **Transparency**: amplifiers recovery exactly the previous span loss
  - **Custom Output Power**: set the amplifiers to always output a certain total power.
  - **LOGO**: input power of each fiber span is set in order to minimize NLI

SNR

SIGNAL NOISE RATIO

$$\mathbf{SNR} = \frac{P_{ch}}{P_{NLI} + P_{ASE}}$$

$$\mathbf{OSNR} = \frac{P_{ch}}{P_{ASE}}$$

$$\boldsymbol{SNR_{NL}} = \frac{P_{ch}}{P_{NLI}}$$